Rock Products

TRADEPRESS PUBLISHING CORPORATION
542 SOUTH DEARBORN STREET
CHICAGO

NATHAN C. ROCKWOOD, Editor — CHAS. H. FULLER, Manager

Vol. XXIII, No. 12 — June 5, 1920

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Applicant for membership in Audit Bureau of Circulations

Second class entry at U. S. Post Office.

Table of Contents

Traveling Cantilever for Phosphate Mining 19, 20
Sutton at Washington Protests Against Discrimination in Car Service 21, 22
How to Get Railway Cars 23, 24
Design of Sand and Gravel Plants 25, 26, 27
New Gravel Plant of the United Materials Co. of St. Paul, Minn. 28, 29
Hints and Helps for the Plant Superintendent 30, 31
Southern Crushed Stone Company Building a Lime Plant 32, 33
Agricultural Limestone Rates High Enough 34, 35
Proposed Agricultural Lime Law Discussed 36, 37
Great Western Cement Company Expands 38, 39
Safe Storage of Coal at Lime and Cement Plants 40, 41
Gypsum-Block Buildings and Houses 42, 43
Chemistry for Lime and Cement Manufacturers 44, 45
Mineral Fillers for Rubber Manufacture 46, 47
Editorial Page—The Lime Convention 48
New Machinery and Equipment 49
Accident Prevention 50, 51
Current Prices of Rock Products 52, 53, 54
General News of the Industries 55, 56
Passed by the Screens 57

ALPHABETICAL LIST OF ADVERTISERS

Aero Pulverizer Co. 72
Aetna Explosives Co. 5
Allis Chalmers Mfg. Co. 77
American Crane & Eng. Co. 63
American Hoist & Derrick Co. 18
American Process Co. ..... Inside front cover
American Well Works ..... Inside back cover
Arnold & Weigel 66
Atlas Powder Co. 11

Bacon, Earle C., Inc. 63
Baldwin Locomotive Works 4
Ball Engine Co. 67
Bates Valve Bag Co. 67
Beaumont Mfg. Co. 76
Browning & Co., Victor R. 74
Browning Co., The 12
Buchanan Co., C. G. ..... Front cover
Buckbee Co., J. C. 65
Byers Machine Co., John F. 63

Caldwell, H. W., & Sons Co. 66
Central Switch & Frog Co. 63
Chapman Engineering Co. 74
Chicago Perforating Co. 62
Chisholm-Moore Mfg. Co. 10
Classified Advertising 59
Classified Business Directory 78
Cleveland Wire Cloth Co. 62
Crescent Belt Fastener Co. 64
Cross Engineering Co. 68

Easton Car & Const. Co. 79
Ehrsam, J. B., & Sons Mfg. Co. 65
Erie Steam Shovel Co. 67

Fate-Root-Heath Co. 15
Fuller-Lehigh Co. 66

Gifford-Wood Co. 66
Grasselli Chemical Co. 9
Green, L. P. 67
Gruendler Pat. Crusher & Pulv. Co. ..... Inside front cover

Hendrick Mfg. Co. 65
Hettrick Mfg. Co. 68
Hunt & Co., Robt. W. 65

Jaite Co., The ..... Inside front cover
Jeffrey Mfg. Co. 17
Johnston & Chapman Co. 68

K.-B. Pulverizer Co., Inc. 68
Kennedy-Van Saun Mfg. & Eng. Corp. 69
Koppel Industrial Car & Equip. Co. 75
Kritzer Co., The 69

Leschen, A., & Sons ..... Inside back cover
Lewistown Fdy. & Mach. Co. ..... Inside back cover
Lima Locomotive Co. 73
Link Belt Co. 6

Marion Steam Shovel Co. 7
Mayer-Hasseldieck Co. 62
McAuliffe, Pierce J. 65
McMyler Interstate Co. 69
Miscampbell, H. 76
Morris Machine Works 73

National Engineering Co. 70
N. J. Wire Cloth Co. 64
Nortmann-Duffke Co. 64

Ohio Locomotive Crane Co. 70
Owen Bucket Co. 71

Pennsylvania Crusher Co. ..... Inside front cover
Pierce-Arrow Motor Car Co. 62
Portable Mach. Co. 64
Porter Co., H. K. 64

Raymond Bros. Impact Pulv. Co. 72
Ruggles Coles Eng. Co. ..... Inside front cover

Sanderson Cyclone Drill Co. 70
Sauerman Bros. Co. 63
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Smith Engineering Works 8
Stearcy-Schmidt Mfg. Co. ..... Inside front cover
Stephens-Adamson Mfg. Co. 79
Stimpson Equip. Co. 3
Sturtevant Mill Co. 14

Traylor Engineering & Mfg. Co. 75

Universal Crusher Co. 67
Universal Road Mach. Co. 70
Used Equipment 60-61

Valve Bag Co. of America ..... Back cover
Vulcan Iron Works 16

Waterbury Co. 77
Watt Mining Car Wheel Co., The 71
Webb City & Carterville Foundry & Machine Co. 71
Webster Mfg. Co. 64
Weller Mfg. Co. 80
Whitcomb Co., Geo. D. 69
Wood Drill Works 63
Worthington Pump & Mach. Corp. 1

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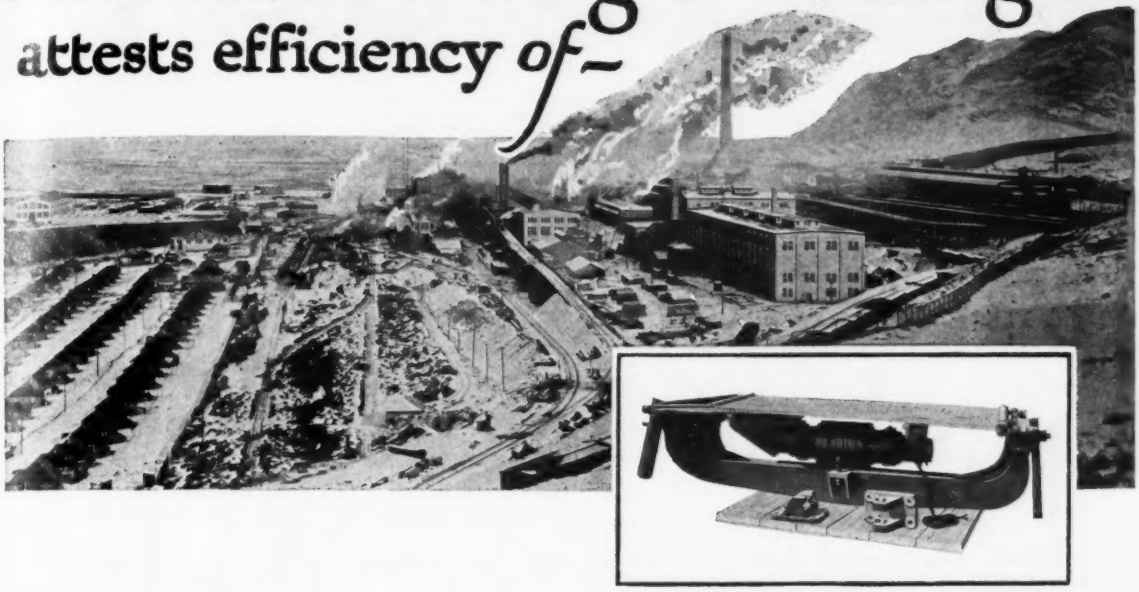
American Smelting & Refining Co.
attests efficiency of—



MITCHELL ELECTRIC VIBRATING SCREEN

The American Smelting & Refining Company has had the Mitchell Screen in operation at its big plant at Garfield, Utah, for seven months. Respecting the Mitchell, the Vice President of the company said:

"At my request, several of our Mechanical Engineers as well as members of the operating staff visited the Arthur Mill (Utah Copper Co.) and inspected this screen. In the opinion of all these gentlemen the Mitchell Screen is far superior to any other screen of which we have had previous knowledge."

And in the same letter: "The construction and operation of this screen is so much in advance of anything that we have heretofore seen that I do not see how anyone who investigates it thoroughly can fail to be convinced of its entire superiority over any other screen that he might purchase."

Although never operated to anything approaching capacity, the Mitchell Screen in the American Smelting & Refining Company's plant averages 30 tons of screened ore per hour through ⅜" mesh. And the power required is less than ⅜ H. P. per screen. Continuous operation for months here, as elsewhere, has proved the correctness of the Mitchell design and its unequalled ability to stand long and arduous usage, without even removing the mechanism from the frame.

The Mitchell handles any granular or crystalline material, coarse or fine, wet or dry

The experience of such firms as the American Smelting & Refining Company will unquestionably prove of value to you in the solution of your screening problems. We shall be pleased to furnish you complete data on request.

STIMPSON EQUIPMENT COMPANY

Manufacturers and Sole Agents

315 FELT BUILDING SALT LAKE CITY, UTAH

When writing advertisers please mention ROCK PRODUCTS

BALDWIN

Efficiency Can Only be Maintained by an Adequate Supply of Repair Parts

THE demand for locomotives for some time to come will be greater than the supply.

Notwithstanding this condition of affairs, the progress of industry must not be permitted to be hampered by the lack of motive power.

In the Rock Products industry, the efficiency of the locomotives now in active service must be maintained at all times. You can safely protect yourself and your industry by keeping an adequate supply of duplicate and repair parts on hand to cope with any emergency.

A feature of Baldwin Service is the prompt forwarding of these parts to keep your motive power in perfect working condition.

THE BALDWIN LOCOMOTIVE WORKS

Philadelphia

LOCOMOTIVES

POSITIVE RESULTS

After you have spent weeks of preparation for a big shot, you cannot afford to be disappointed in the results. Disappointments are expensive. Avoid them by using

AETNA EXPLOSIVES

In action, Aetna Explosives are positive and dependable. They never fail to live up to your expectations as to quantity and size of rock broken, if your calculations have been correctly made.

Aetna Explosives are manufactured in several grades, each carefully calculated to operate most economically in connection with rock of a particular type.

The practical experience of our blasting experts is at your command without obligation.

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Incorporated
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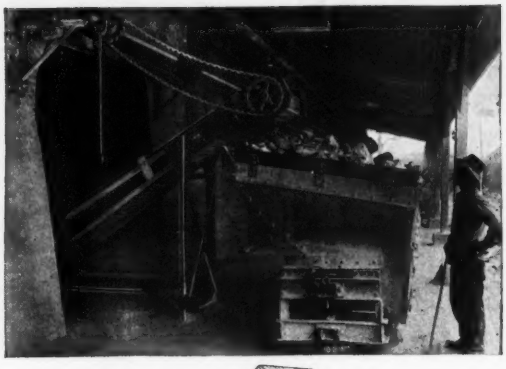

Save Labor In Handling Lime

The possibilities for great savings, both in labor and time, by employing Link-Belt Conveying Machinery, in handling lime from kilns to cars, are many.

A typical Link-Belt kiln-drawing installation is shown below. By this method the lime is drawn, stored, screened, core picked, and the lump delivered to box cars, in a very efficient and mechanical way.

This layout is typical. Modifications can be made to fit conditions in nearly every style of lime burning plant. Let one of our engineers give you the benefit of his experience in this work.

We also design and build complete installations for handling gravel, stone, coal and similar materials. Catalogs on request.

LINK-BELT COMPANY
PHILADELPHIA, Hunting Park Ave. and P. & R. Rwy.
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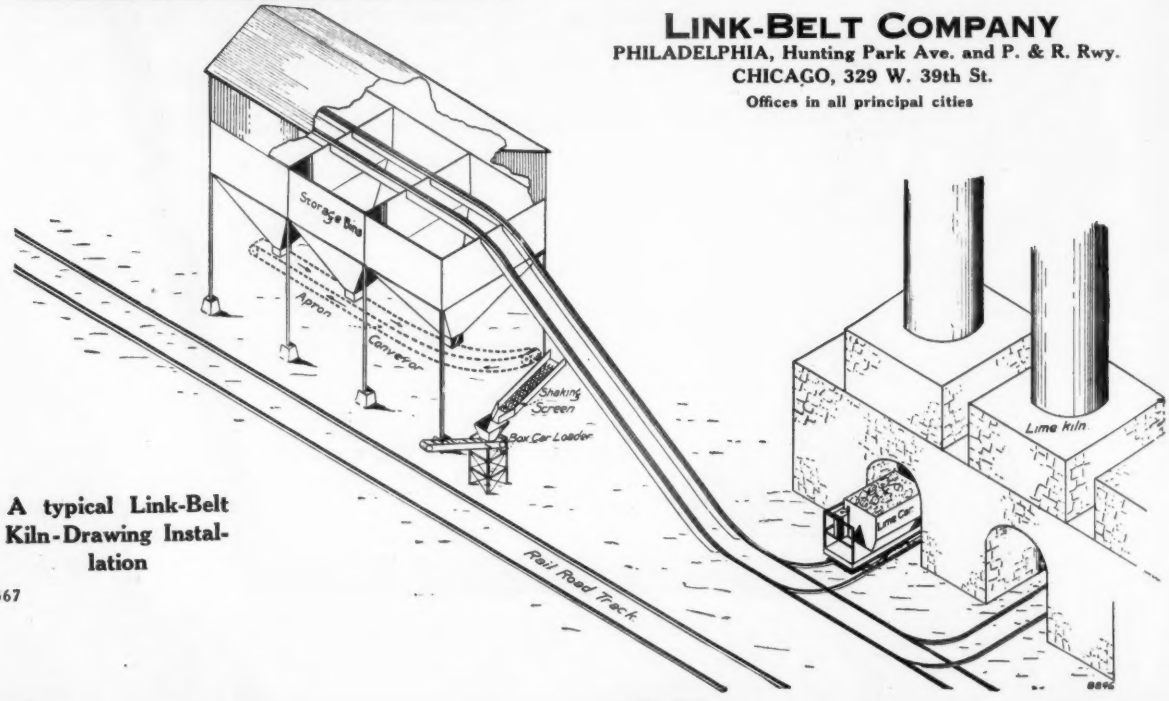

A typical Link-Belt Kiln-Drawing Installation

567

LINK-BELT
Stone Handling Machinery

"MARION" Shovels, with their steady, capable work the whole country over, have helped develop the sand and gravel industry from a farmer's side line to one of the most important elements in the engineering and contracting fields.

From the beginning, "Marions" have helped producers hold their outputs on a steady, profitable basis—even with an uncertain labor supply and unfavorable operating conditions. "Marion" Standard and Revolving Shovels are digging in hundreds of "dry" sand and gravel pits; "Marion" Draglines and Dredges are reclaiming big yardages each day in operations under water.

Put your work up to us. We'll gladly tell you, in detail, just what a "Marion" can do for you; what it will cost; and when we can ship. We are now building "Marions" of certain popular types in increased quantity and are advancing deliveries rapidly.

THE Marion STEAM SHOVEL CO.

Established 1884 Marion, Ohio

New York Chicago Atlanta San Francisco

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EVERYWHERE - RELIABLE
The Marion Steam Shovel Co.
ESTABLISHED 1884

When writing advertisers please mention ROCK PRODUCTS

The Telsmith Bolt-Shaft Breaker

Cuts Labor in the Quarry

The Telsmith Primary Breaker exerts the **full stroke** on the big lumps just as they enter the bowl. The initial bite is a long, horizontal, bull-dog grip that doesn't let go. It just fairly eats into the rock, increasing the capacity, reducing the labor in the quarry and over the crusher.

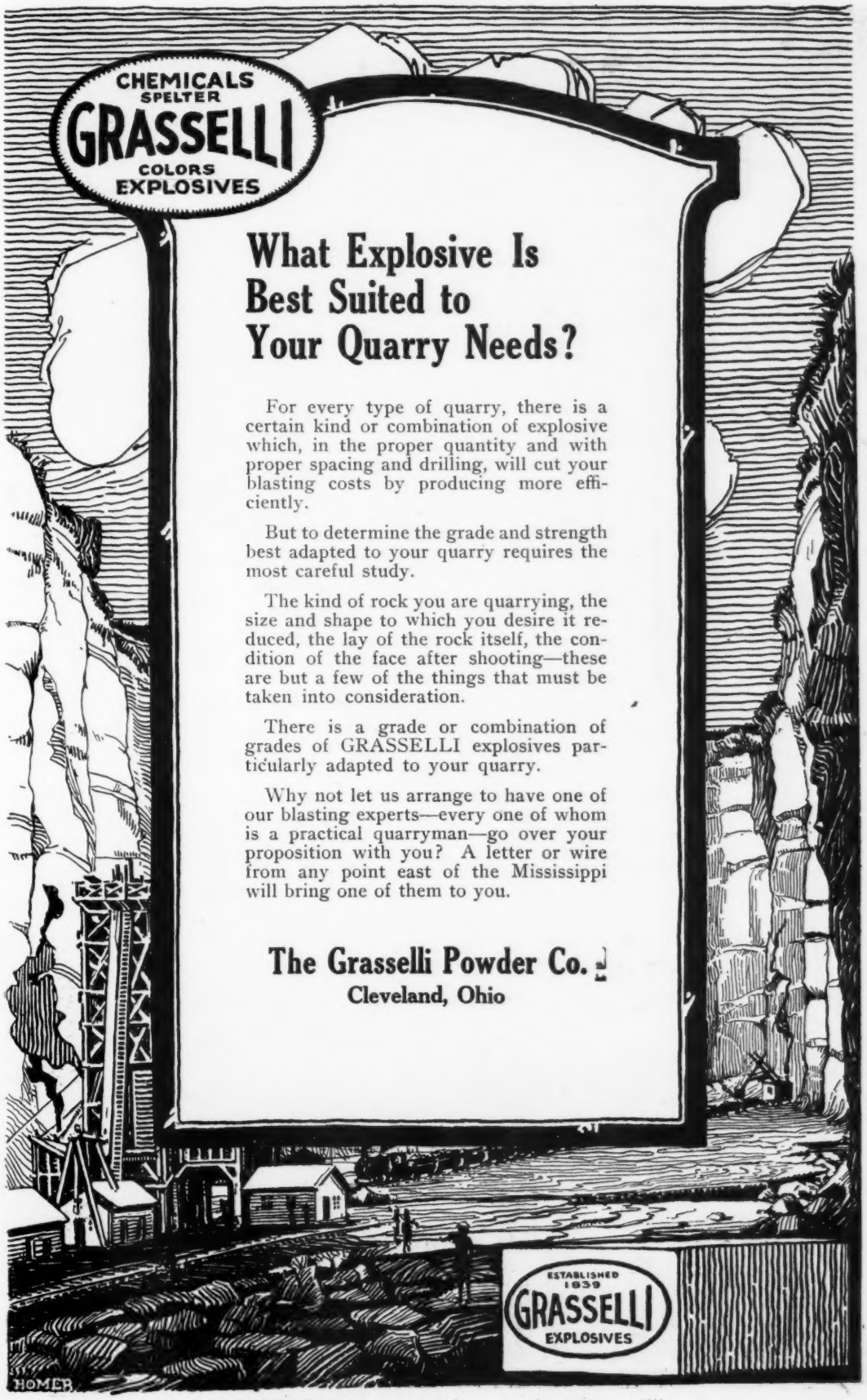
Then Telsmith has bigger feed openings. While the **width** of the opening is the same as in other gyratory crushers, in every other dimension of the concave bowl and crushing cone Telsmith is 25-35 per cent bigger than other crushers. Don't take our word for it, but measure up the machines. When you have done that, you'll not be surprised to find Telsmith doing such splendid work for Hilder Granite Co., St. Cloud, Minn.; Charles Warner Co., Wilmington, Del.; United Railways Co., St. Louis, Mo.; Storey Rock Co., Bozeman, Mont.; Thomas Iron Co., Wharton, N. J.; Defrain Sand Co., Philadelphia, Pa.; Thomasville Stone & Lime Co., Thomasville, Pa.; Webster Stone Co., Irvington, Ky.; Federal Lead Co., Flat River, Mo., and a host of other plants.

Glad to send you our breaker Catalogue No. 166 and our Bulletin No. 2F11 describing the Telsmith Reduction Crusher

SMITH ENGINEERING WORKS

3188 Locust St., Milwaukee, Wis.

545 Old Colony Bldg., Chicago, Ill. 30 Church St., New York City. 710 Witherspoon Bldg., Philadelphia, Pa. 930 Oliver Bldg., Boston, Mass. 110 W. Park Way N. S., Pittsburgh, Pa. 325 W. Main St., Louisville, Ky. 827 Summit St., Toledo, Ohio. Franklin and Channing Avenues, St. Louis, Mo. Chester, Fla. Salt Lake Hardware Co., Salt Lake City, Utah. 625 Market St., San Francisco, Calif. Road Builders' Eq. Co., Portland, Ore. Watson, Jack & Co., Montreal, P. Q. Kelley Powell Ltd., Winnipeg, Man.


CHEMICALS
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GRASSELLI
COLORS
EXPLOSIVES
What Explosive Is Best Suited to Your Quarry Needs?
For every type of quarry, there is a certain kind or combination of explosive which, in the proper quantity and with proper spacing and drilling, will cut your blasting costs by producing more efficiently.
But to determine the grade and strength best adapted to your quarry requires the most careful study.
The kind of rock you are quarrying, the size and shape to which you desire it reduced, the lay of the rock itself, the condition of the face after shooting—these are but a few of the things that must be taken into consideration.
There is a grade or combination of grades of GRASSELLI explosives particularly adapted to your quarry.
Why not let us arrange to have one of our blasting experts—every one of whom is a practical quarryman—go over your proposition with you? A letter or wire from any point east of the Mississippi will bring one of them to you.
The Grasselli Powder Co.
Cleveland, Ohio
ESTABLISHED 1839
GRASSELLI
EXPLOSIVES
HOMER

Here's an idea for *you*

"C-M" MATCHLESS" ADJUSTABLE FRAME TROLLEYS

INGENIOUS arrangements of "C-M" Trolleys can help you out of many a tight place. The Electric Steel Foundry, of Portland, Oregon, had many large castings which could not be economically ground by ordinary means. A little ingenuity and two "Matchless" Trolleys turned the trick, as shown above.

With this idea in your head go into your plant and look for places where you can speed up operation and cut costs by a trolley installation.

A complete catalog of hoisting, conveying and labor-saving appliances sent on request.

The Chisholm-Moore Mfg. Co.
Cleveland, O.

Hoists Cranes Trolleys

BRANCH OFFICES:

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Detroit, 1136 David Whitney Bldg.

Hoists
Cranes
Trolleys

Chisholm-Moore

Atlas Explosives

are reducing costs in quarries, gravel pits and construction work. There is an ATLAS Explosive for every blasting requirement.

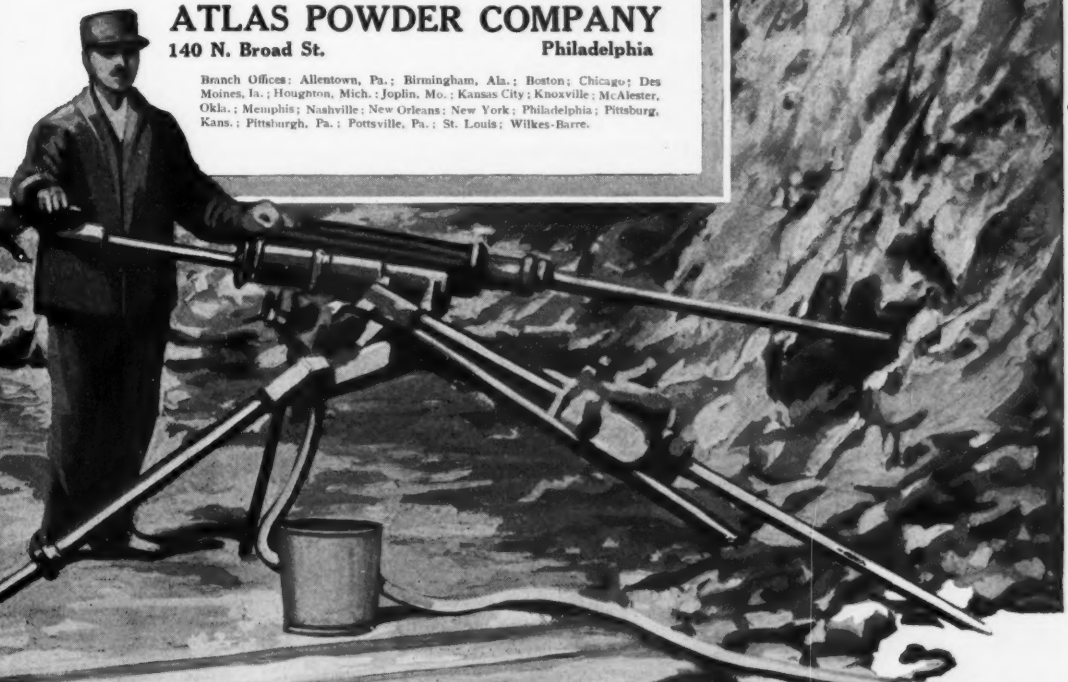
The ATLAS Chemical Laboratories, Research Division and Service Division are all working together for a single purpose—to enable users of ATLAS Explosives to get the best results at the lowest cost.

ATLAS service is *personal* service. Our Explosive Engineers will gladly co-operate with you on your blasting problems. They will study conditions and recommend explosives which will enable you to do more efficient and economical blasting. Whether or not you are now using ATLAS Explosives, your best interests will be served if you will "put your blasting problems up to us."

ATLAS POWDER COMPANY
140 N. Broad St. Philadelphia

Branch Offices: Allentown, Pa.; Birmingham, Ala.; Boston; Chicago; Des Moines, Ia.; Houghton, Mich.; Joplin, Mo.; Kansas City; Knoxville; McAlester, Okla.; Memphis; Nashville; New Orleans; New York; Philadelphia; Pittsburg, Kans.; Pittsburgh, Pa.; Pottsville, Pa.; St. Louis; Wilkes-Barre.

ATLAS EXPLOSIVES



break the rock right

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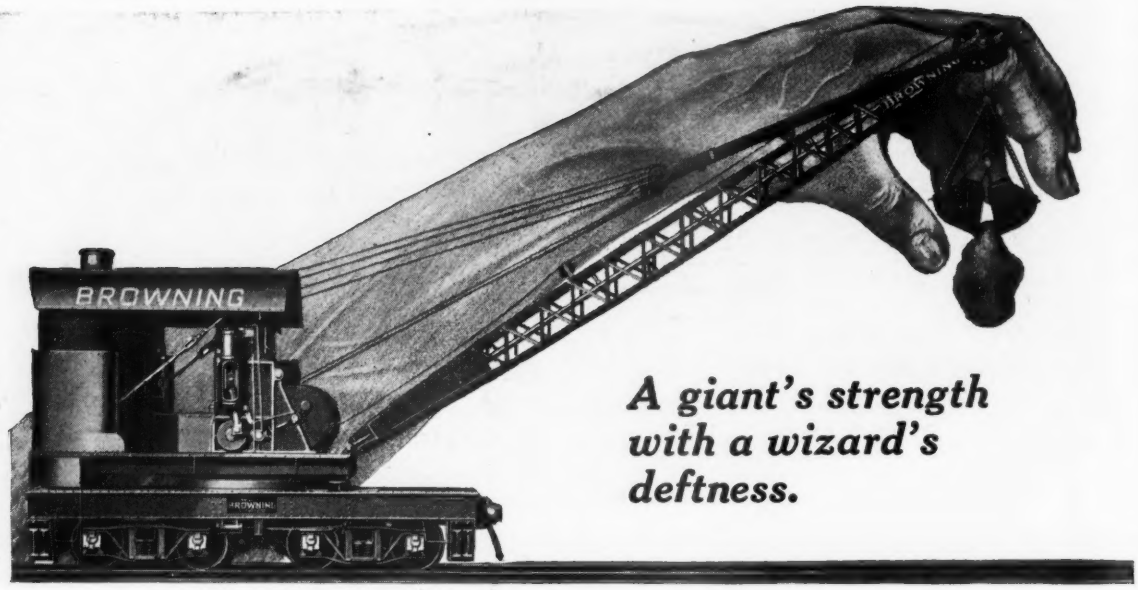

A giant's strength with a wizard's deftness.

AS flexible as a human arm but with a giant's strength a Browning Crane reaches here for a rugged boulder, there for a bucket of sand, or, with a set of Browning pile-driver leads, acts as a mighty hammer to pound piles into the face of Mother Earth. Picture a shovel fit for a giant's hand scooping up two cubic yards of dirt at a time and depositing it where it pleases, or a giant hand picking up a structural steel member and placing it delicately in position a hundred feet in the air.

With the operator's brain to direct it a Browning Locomotive Crane works with the strength, intelligence and all-'round adaptability of a human hand with strength to lift ten, twenty, thirty tons or more.

A catalog describing the manifold operations possible with a Browning Crane will be sent on request.

THE BROWNING COMPANY
CLEVELAND, OHIO

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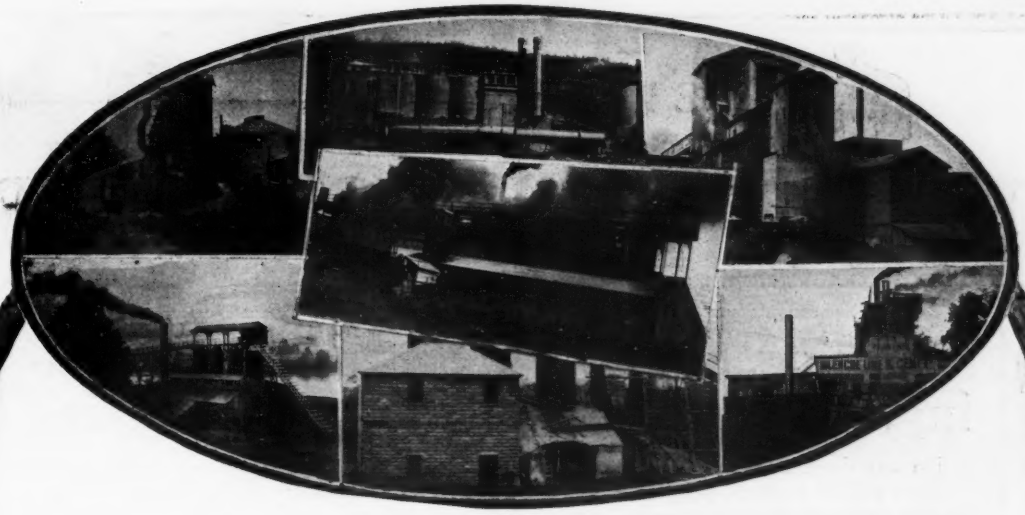
Chicago	Portland	Salt Lake City		Washington, D. C.

BROWNING
LOCOMOTIVE CRANES



ALL ABOARD

Lime men—hundreds of the men at the head of lime plants throughout this country—will attend the

ANNUAL CONVENTION
of the
National Lime Association
New York—June 17-18

Big "doings" expected. Not only the lime producers but men throughout the rock products industry with similar problems will look for the report of the proceedings at this important convention. The complete story will be told in the news magazine of the industry—in

Rock Products
Lime Convention Report Number
Issued July 3, 1920

The wise advertiser will take advantage of this exceptional opportunity to interest these buyers by using liberal space in this important special issue.

Send your space reservation in at once, please

ALL ABOARD

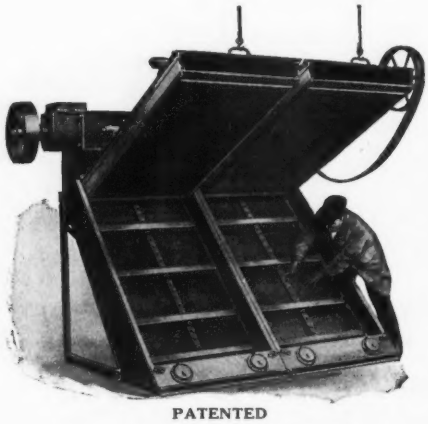
"ONE MAN – ONE MINUTE"

STURTEVANT "OPEN-DOOR" MACHINERY

Crushing, Grinding, Screening, Elevating, Conveying, Weighing and Mixing

No one doubts the saving effected by the Open Door which allows one man to do the work of a whole gang of men and in less time. Minutes replace hours. One man replaces many men—shut-downs, for replacements, inspection or cleaning are short. Production is almost continuous, non-productive "waiting" labor is eliminated; overtime and Sunday work is not necessary, all because everything is quickly accessible. The parts are easy to get at—the machines therefore can be kept in perfect condition for maximum outputs.

If trouble occurs it is instantly found and remedied through the Open Doors—the machines do not have to be taken apart by experts and valuable time lost. Just swing the door open, exposing every working part, and remedy the difficulty.



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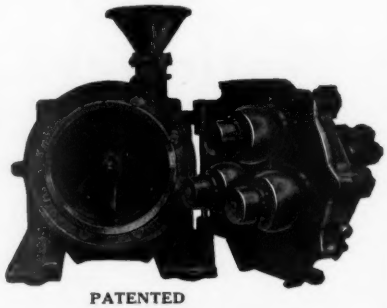

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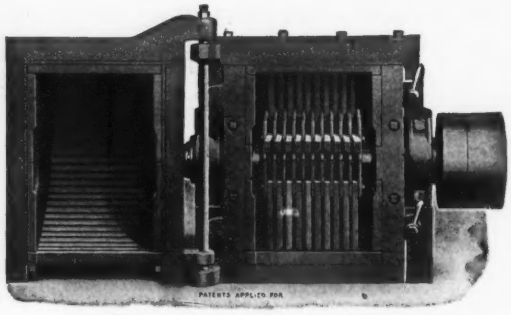

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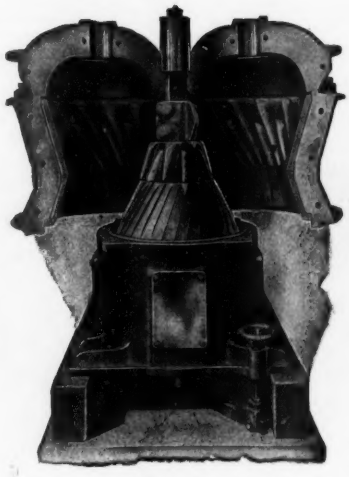

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STURTEVANT MILL CO., BOSTON MASS.

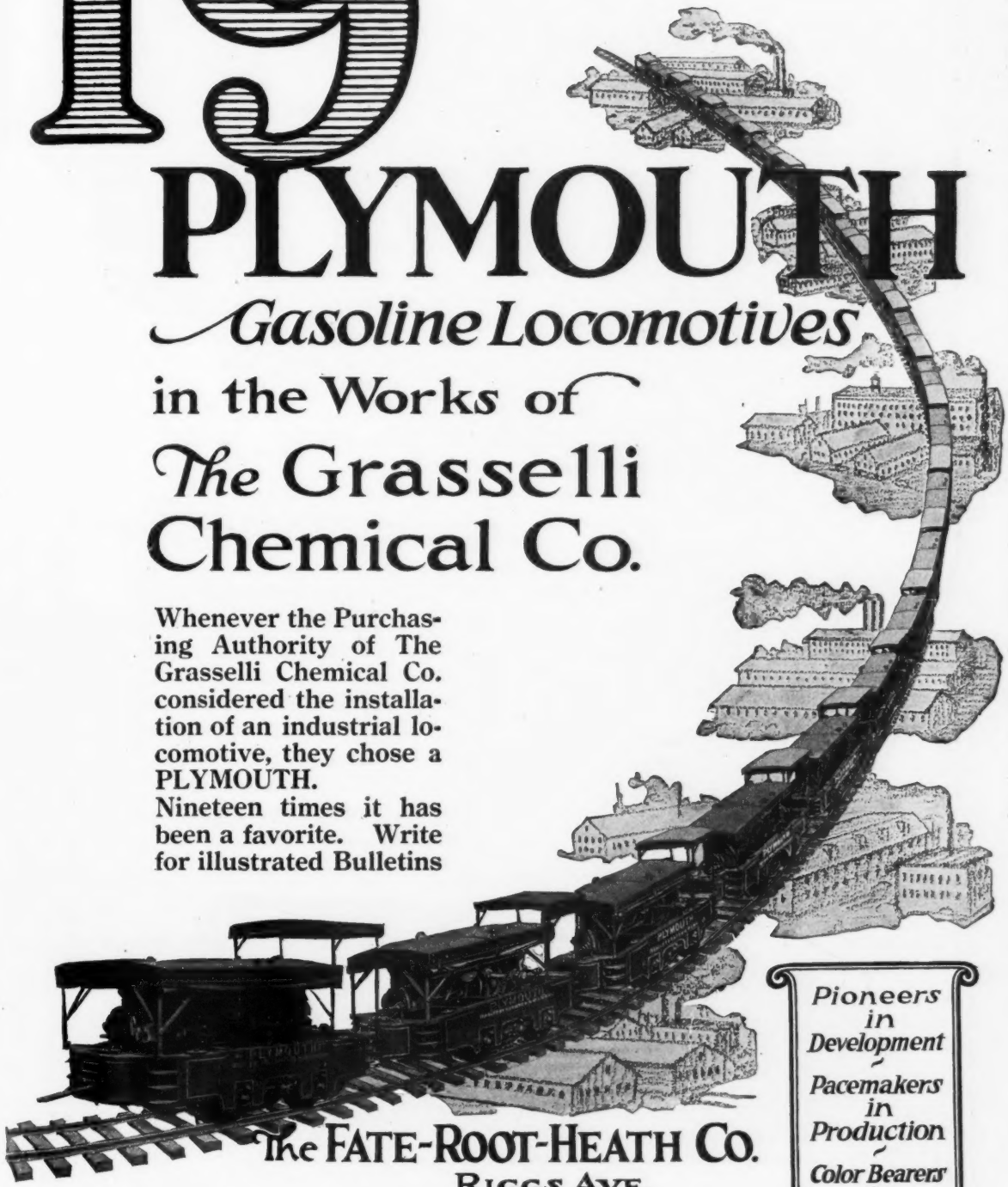
HARRISON SQUARE

19 PLYMOUTH

Gasoline Locomotives

in the Works of

The Grasselli Chemical Co.



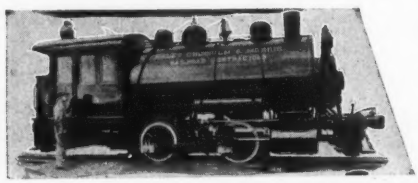
Whenever the Purchasing Authority of The Grasselli Chemical Co. considered the installation of an industrial locomotive, they chose a PLYMOUTH.
Nineteen times it has been a favorite. Write for illustrated Bulletins

Pioneers in Development
Pacemakers in Production
Color Bearers in Service

The FATE-ROOT-HEATH Co.
RIGGS AVE.
PLYMOUTH, OHIO.

VULCAN

Hauling Capacity



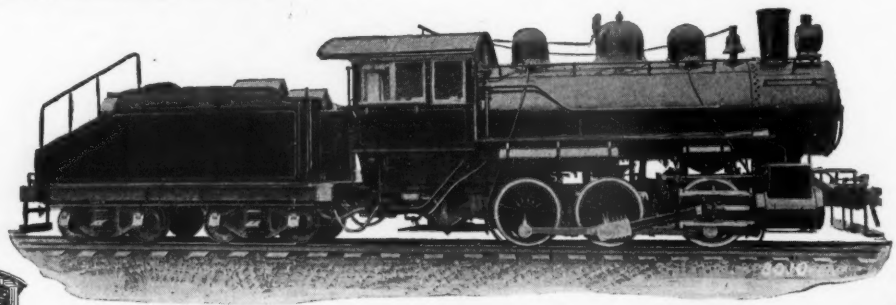
Used on the construction of state road, this very light, 7 x 12, saddle tank locomotive operates over *very* uneven portable track, on 20-lb. rails. It starts 21 loaded cars on a total of 63 tons on curves of 30 feet radius on grades of 2% and 2½%.

It hauled 232 tons every day for eight months, an average of 42 miles per working day of eight hours. Its regular daily performance was 134.1% efficient. Another typical VULCAN record.

VULCAN IRON WORKS

Locomotive Designers and Builders

1753 Main St., Wilkes-Barre, Pa.



VULCAN Contractors' Locomotives—many sizes and types from 7½-ton 6 x 10's to 75-ton 20 x 26's (120-ton with tender).

VULCAN

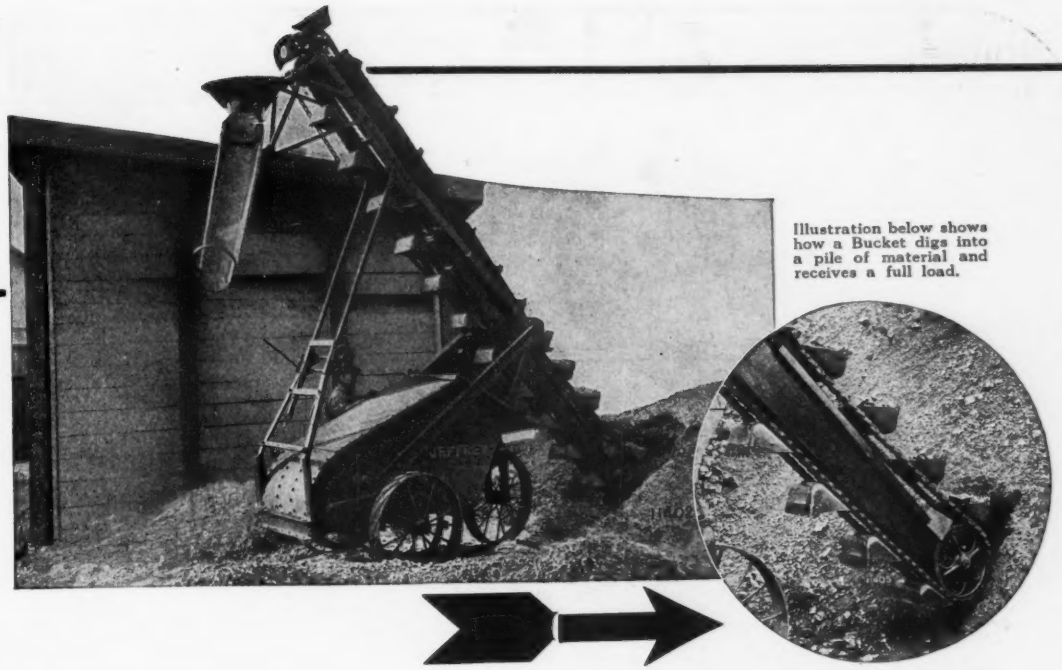


Illustration below shows how a Bucket digs into a pile of material and receives a full load.

Actually Digs Into the Pile

No Handshoveling or Special Mechanical Devices to pull material in front of the buckets are necessary with the

Jeffrey Radial Loaders

The Elevators of Radial Type Loaders are mounted upon a 3-wheel chassis. Buckets of the Elevator are wider than the elastic boom. These features allow the machine to advance into the material 8 to 10 feet without any cleaning up whatever.

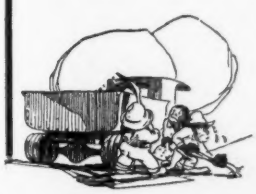
The Radial Loaders are built in two sizes—Type "K" will load one cubic yard per minute—Type "G" loads 1½ to 2 cubic yards per minute.

All the features absolutely essential to obtain the greatest results are embodied on Radial Loaders. Catalogs No. 288-N and 309-H have complete details. Write for a copy.

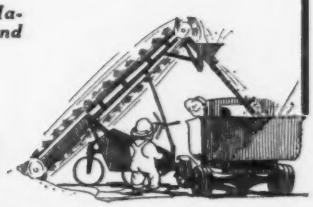
The Jeffrey Mfg. Co., 935 North Fourth St. Columbus, Ohio

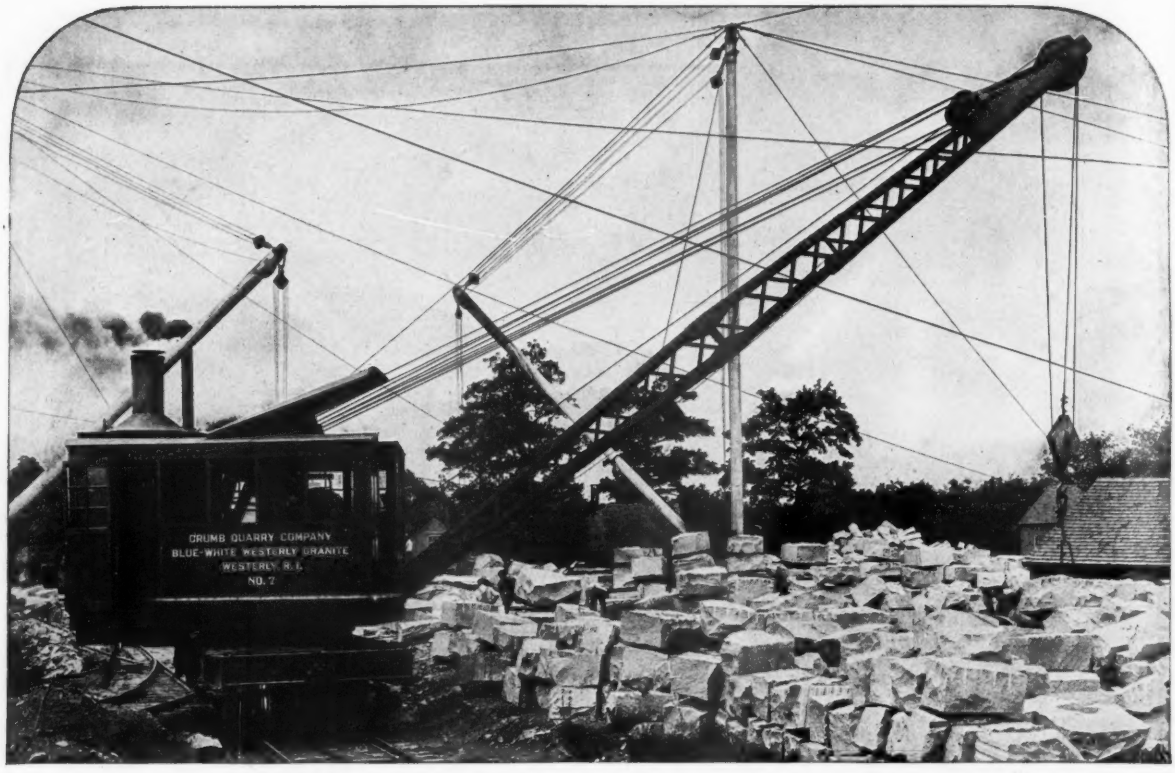
New York Boston | Scranton Charleston, W. Va. | Philadelphia Cleveland | Pittsburgh Chicago | St. Louis Birmingham | Dallas Milwaukee | Los Angeles Denver | Montreal Detroit

Manufacturers of Pulverizing, Conveying and Elevating Machinery; Chains; Self-Propelling Loaders; Electric Trolley and Storage Battery Locomotives, etc.



Handle it Mechanically





"AMERICAN" Locomotive Cranes Built to Withstand the Severest Service

AMERICAN" Locomotive Cranes are built to stand powerful strains, shocks, severe work and abuse. The first insurance of this is its racer or revolving deck which is a massive single-piece gun-iron casting.

Upon this crane deck casting, the boiler, engines, drums, hand levers, and other parts, are securely mounted in a compact and convenient manner. The drums and reversing gears are placed low down on crane deck, easy to get at.

The non-reversing, horizontal, double-cylinder, smooth running engines are constructed for maximum power and long use.

The controlling levers are plainly labeled and located well to front, away from heat of boiler, giving operator full view of load at all times.

The illustration above shows an "AMERICAN" Locomotive Crane that has been used by the Crumb Quarry Company, of Westerly, Rhode Island, for over four years with supreme satisfaction, and is in use today.

No matter where you are, an "AMERICAN" representative can reach you in twenty-four hours.

"Give me where I may stand and I will move the world."

American Hoist & Derrick Co.

Saint Paul Minnesota

Builders of "AMERICAN"

Hoisting Engines	Locomotive Cranes	Sugar Cane Machinery
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Rock Products

Vol. XXIII | Chicago, June 5, 1920 | No. 12

Traveling Cantilever Device for Phosphate Mining

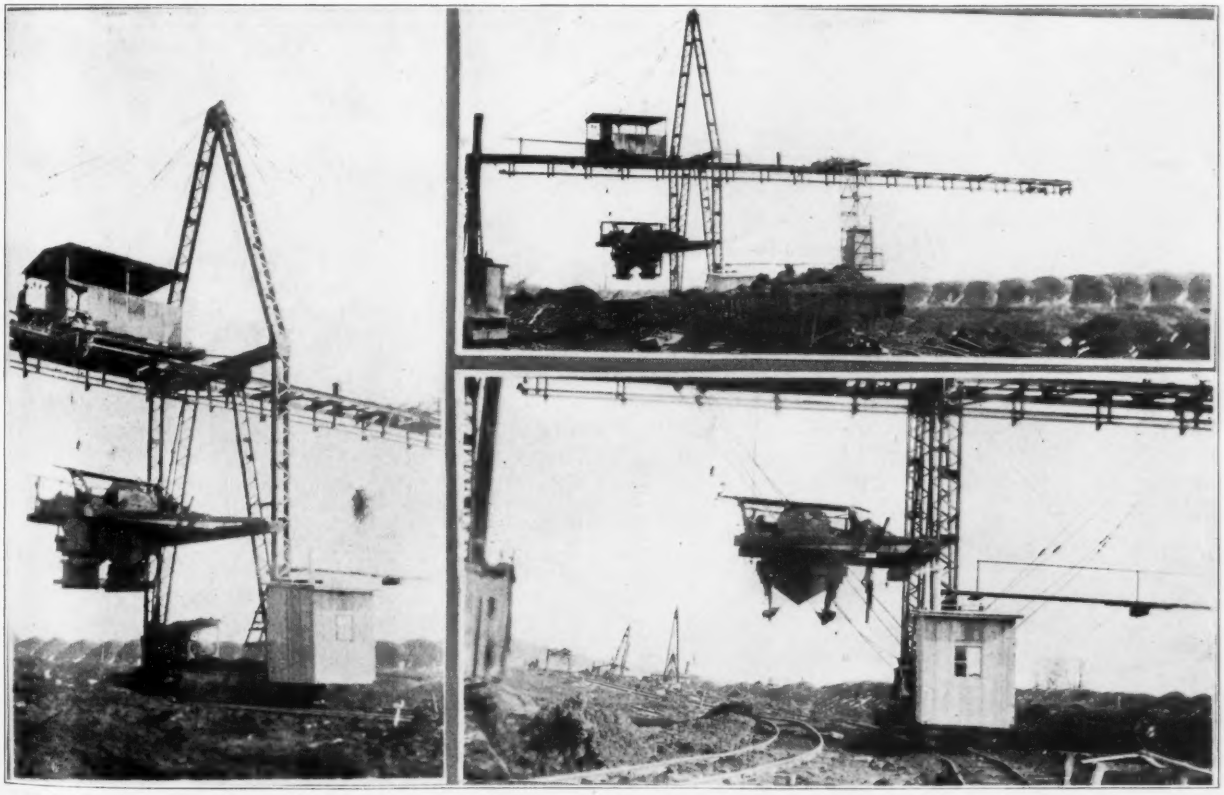
Scheme Which Possibly Could Be Used for Stripping a Very Seamy Quarry Top

THE BROWN PHOSPHATE ROCK in the Mt. Pleasant, Tenn., district is underlaid with a very irregular limestone which has pockets as deep as 6 to 8 ft. The removing of the phosphate from these pockets is one of the most difficult problems found in the industry. All methods have been tried—hydraulic, hand method and the drag-line method.

The latest method which was devised by the Hoover-Mason Phosphate Co. is illustrated here. The Hoover-Mason company is also a well known engineering and contracting company of Chicago and it has designed and constructed the entire plant. W. S. Mabee is superintendent in charge of operation and has done erection work for the company for 20 years. He was largely instrumental in the design of the cantilever excavator used to remove the phosphate from the limestone pockets.

The apparatus consists of a large structural steel portable cantilever traveler which extends out over the mine. The A-frame construction and the method used to move the machine along over the work is well illustrated in the views.

The cantilever traveler is supported upon two parallel tracks along the bank



Left—View showing the detail construction of the A-frame which is the main support of the machine. Right (Above)—View showing the arm which extends out over the pit and the two separate supports which are each mounted upon railroad tracks. Right (Below)—Close-up view of the hopper from which the phosphate is loaded into the mine cars

of the mine. Since the two tracks are not aways on the same level, the joint between the outer support and the cantilever is made a hinge joint so that there would not be a bending moment when the two supports were on uneven ground.

This machine follows the drag-lines after the phosphate has been worked down to the surface of the limestone. A three-sided skip is run out on the cantilever arm and lowered into the mine where it is filled by workmen. It is then elevated, run in and dumped into a hopper over the loading track.

The workmen are paid on piece-work basis and since the skips may be spotted where they can be most easily loaded, the work progresses very rapidly. This company has tried several other methods but finds that this is the most satisfactory.

Lime for Potato Seed

I CUT MY SEED POTATOES, dust them with air-slaked lime, and then turn them a few times so every one becomes well coated. This seems to cause them to form a callous. Then I lay them out in the sun for two or three days before planting. After this treatment they will stand all the wet weather we ever have in a single season and won't rot. I have done this for the last fifteen years and I always have a good crop.—E. L. S., in the "Pennsylvania Farmer."

New Southern District Quarrymen's Association Formed

A RECENT DEVELOPMENT in the southern quarry industry, has been the Tri-States Quarrymen's Association, which includes the operators of southern Kentucky, central Tennessee and part of Arkansas. The association has nine members, is well organized and has regular meetings. J. B. Ezzell, of the Ezzell Mill and Stone Co., Newson, Tenn, is president of the association, and C. W. Cooper, The H. L. Herbert & Son Co., Nashville, Tenn., is secretary.

The first thing that the association is going to work toward will be cost accounting. Uniform methods of figuring costs will be advised so that the various companies can really figure out and know what a ton of stone costs. Other things which the association will recommend are the establishment of storage facilities for agricultural limestone, the collecting of money for promotional work and cooperation among stone producers of the South.

As yet no method of collecting funds has been devised—so far the expenses have been evenly divided among the producers, but eventually the association will be supported by assessments on a tonnage basis. There are no salaried officers at present.

Mr. Cooper is an engineer and has charge of overseeing the several quarries of which The H. S. Herbert & Son Co. is the selling agent.

Rock Phosphate Leads in Value of Tennessee Minerals

NASHVILLE, Tenn.—The total value of minerals produced in Tennessee in 1919 was $40.946,992, according to the State Mining Department, which has just completed the tabulation of statistics for that year. A comparison with 1914, the last year of normal operations preceding the war, shows an increase during 1919 of $20,033,488 or to nearly double the value of 1914 production.

The big gain however is attributed in part to increased values rather than increased production. In 1914 379,826 long tons of phosphate valued at $1,282,-197 were produced as against 837,283 long tons valued at $3,549,683 in 1919. The quantities in which various minerals were produced and the lump values, included among others the following: Barytes, 10,000 short tons, $45,000; bauxite, 1,500 long tons, $9,000; cement, 1,678,981 barrels, $2,677,533; lime, 86,034 short tons, $425,344; mineral paints, 3,251 short tons, $73,211; phosphate rock, 867,282 long tons, $3,549,683; quartz (crystalline) 24,517 short tons, $25,517; sand, gravel, 494,538 short tons, $353,937.

The cantilever has lowered the skip into the mine and two men are spotting it up under a projecting piece of limestone and the man above is loosening the phosphate with a bar. It can be seen that here the limestone umbrella has been blasted off to get at the phosphate underneath. In the foreground is one of the deep crevices cleaned out. Piles of stripping are seen in get at the phosphate underneath. In the foreground is one of the deep crevices cleaned out. Piles of stripping are seen

Sutton at Washington Protests Discrimination in Car Service

Business Manager of National Association of Sand and Gravel Producers Believes Interstate Commerce Commission Will Not Issue Embargoes in Favor of Coal Movement Except in Case of Dire Necessity

WITH THE FIRST INTIMATION that the railways would ask for priority orders to furnish cars to the coal mines at the expense of the mineral aggregate industry, E. Guy Sutton, business manager of the National Association of Sand and Gravel Producers, went to Washington, D. C. Since then he has written the editor as follows:

"Enclosed herewith you will find the petition submitted to the Interstate Commerce Commission by the National Association, protesting against the issuing of priorities that would have the effect of unduly restricting the movement of sand and gravel. The brief was written by H. C. Huffstetter, president of the Indiana Association, in collaboration with myself.

"You will gather from the petition of the railway executives to the Interstate Commerce Commission that they have asked that the powers conferred on the Commission by Congress be delegated to them. I am convinced, however, that the Commission is averse to such action, and while the Commission no doubt will take appropriate steps to relieve the situation by adopting measures that will clear congested districts, yet the railroads must act under definite orders issued by the Commission, and not of the railroads' own making.

"I am also enclosing copies of Services Orders Nos. 1, 2 and 3, issued by the Commission May 21, which primarily give authority for the diversion of some 30,000 open-top cars from the West to the East, and about 20,000 box cars in the reverse direction. Undoubtedly the movement of open-top cars to points east of the Mississippi will relieve the shortage in that territory, but contrarywise, will reduce the available supply in the district west of the River.

"The execution of these orders was delegated to the Commission on Car Service, and they have issued instructions to the railroads directing how the movement of cars shall be made.

"According to reliable information received at the Interstate Commerce Commission May 21, and from talking with members of the Commission on Car Service, it is clearly the intention of the I. C. C. to prevent the issuance of priority orders, and such a measure will be resorted to as a last extremity. The Commission seems to be thoroughly imbued with the fact that so far as possible no one industry should prosper at the expense of another, and except in cases of dire necessity, all industries should be accorded like treatment in the matter of transportation. This is the view that our Association has had in the past and is still striving to impress on every agency having to do with transportation.

"At the present time sand and gravel producers should be accorded the same proportion of cars as are being furnished to the mines. However, the general impression seems to be—from the newspaper reports at least—that coal is to be accorded preference. Unless different orders are issued, this, however, is not correct. If sand and gravel producers are not receiving their proportionate share of equipment, they should report details to their National Association so that complaint may be brought forcibly to the attention of the Commission on Car Service, or the Service Bureau of the Interstate Commerce Commission, as conditions may warrant.

"I do not know that I have any further suggestion to make in regard to the matter at this time, except I would recommend that the shippers of mineral aggregates in so far as possible keep in touch with the terminal committees and endeavor to impress upon them the undesirability of such committees advising the issuance of priorities. The Interstate Commerce Commission at the present time seems to be impressed with the undesirability of operating the railroads under the priority system. I am convinced that body will not be stampeded by the propaganda of coal operators and other interests that would be favored thereby, provided too strong pressure does not come from the terminal committees advising such action."

The following is the petition filed with the Interstate Commerce Commission by the National Association of Sand and Gravel Producers. (A similar petition was filed by the Portland Cement Association and by National Federation of the Building Industries):

Inasmuch as certain carriers embracing the chief transportation lines of the country have petitioned the Interstate Commerce Commission, under the provisions of Section 402 of the Transportation Act 1920, to issue such orders and directions as will give preference or priority in transportation, embargoes and movements of traffic under permits, the National Association of Sand and Gravel Producers, representing sand and gravel industry throughout the United States, begs to submit:

That in view of the disturbed and unsettled conditions of the country, conditions only to be successfully met by careful, considerate and concerted action on the part of the business world and governmental authorities and in such manner as will adjust and maintain a perfect and just equilibrium between all basic industries, and to the end that no legitimate business shall be subjected to any unjust discrimination thus disturbing the necessary relationship of a part to the whole, the National Association of Sand and Gravel Producers feel it incumbent upon them to offer the following reasons for the continuance of the present car service to its individual members even the increase thereof rather than the curtailment, in order that the conditions set out above may be met and continue to obtain.

The National Association of Sand and Gravel Producers would show to your honorable body that the members of the industry which it represents are engaged in a business, the products of which enters into the very foundation and existence of a large majority of the nation's activities that make for the welfare, comfort and happiness of the whole people. They furnish the basic materials for all buildings, whether it be homes or factories; their gravel ballasts for the great arteries of commerce—the railroads; their sand is needed for the greater tractive power of the locomotives of the railroads; their materials are necessary for the production of coal, both in construction work and in the form of motor sand, which enables the small electric engines to draw the mined coal to the mouth of the shaft from which it is hoisted; their materials enter into the construction of silos and fireproof granaries upon the farm and in a larger degree in the building of elevators and warehouses that must be erected for the storing of the nation's food supply; the great glass industry of the country must have sand or shut down; the foundries make the mold and core from sand, and when it is not obtainable the industry must perforce close its doors and lose its contracts and its labor organization; the great system of highways over which primarily must

be borne the food supply of the country must have gravel and sand for their construction and maintenance, and any failure along this line adds further to the cost of the food products in proportion to the difficulties of initial transportation. The great brick industry must have mortar sand or cease to exist; the portland cement companies with millions of money invested and thousands of men employed cease operation, when sand and gravel are denied transportation; the lime industry, the lumber industry, the builders of dry kilns for brick and lumber; the plants for the making of road machinery; the manufacturers of crushers, concrete mixers, hoisting engines, belt conveyors, elevators, revolving screens, and many other industries giving employment to thousands upon thousands of men are dependent upon the sand and gravel production and transportation for their very business life.

The National Association of Sand and Gravel Producers would further show to your honorable body that its members during the war curtailed their output to the losing point in order that the government's needs for open-top railroad equipment should be met; and that interest charges, development cost and necessary overhead charges have piled up against each individual producer's business until further hindrance and curtailment in their operation would soon lead to the bankruptcy of the business as a whole.

They would further call the attention of your honorable body to the fact that the curtailment of the production of sand and gravel for building purposes has made possible the rent profiteer and rendered the householder the prey of greedy landlords; that the great market highways have been allowed to deteriorate to the point to where the cost of restoration will almost equal their original cost of construction.

It is now the desire of the National Association of Sand and Gravel Producers to petition your honorably body to make no discriminatory orders against the movement of sand and gravel by the common carriers of the country; and to ask that in justice to an industry that has already borne the hardship of both denial of necessary railroad equipment for the shipment of its materials, and an unjust addition to the previous high freight rates applying on its products, be not further handicapped in its operation, and that in view of the many uses of sand and gravel by dependent industries, further restriction of their movement will not in any way assist in the reorganization and restoration of business equilibrium, but will make for a more chaotic condition than now prevails.

Very respectfully submitted on behalf of the NATIONAL ASSOCIATION OF SAND AND GRAVEL PRODUCERS, by E. Guy Sutton, business manager.

Labor Getting More Plentiful in Wisconsin

LABOR appears to be getting more plentiful in the larger industrial cities, with a decrease in farm production. It indeed behooves all producers to get out the maximum amount of shipments every day in view of the fact that no one can apparently prophesy the conditions 90 or even 60 days hence.—O. C. Hubbard, executive secretary, Wisconsin Mineral Aggregates Association.

Wake Up!

"WE ARE RIGHT NOW confronting a situation of equal or greater gravity than at any time during the war period. We are endeavoring to meet it with a united front, and we hope and ought to get tangible results."—V. O. Johnston, President of the National Association of Sand and Gravel Producers, writing from Washington, D. C.

Ohio Sand and Gravel Producers Join National as a Unit

THE OHIO SAND AND GRAVEL PRODUCERS' Association met at the Hotel Deshler, Columbus, Ohio, on May 11, with a representative attendance.

E. Guy Sutton, business manager of the National Association of Sand and Gravel Producers, addressed the Association on matters of national interest to the industry and also urged the affiliation of the Ohio Association with the National Association as a body.

Mr. Sutton was followed by V. O. Johnston, President of the National Association, whose remarks were timely and inspirational.

After a full discussion of the matter of the Ohio Association joining the National Association as a body, on motion of Harry Donnelly, seconded by H. R. Gill, it was unanimously decided to take such step.

The financial affairs of the Association were discussed by the Secretary-Treasurer, F. C. Fuller, and members of the Association. It was decided to collect from the members of the Association assessments sufficient to pay the National and State Association dues, and on motion of George Walker, seconded by Henry Gerhardstein, the executive committee was empowered to make an assessment not to exceed four mills per ton per annum.

E. E. Watson, Actuary of the Industrial Commission of Ohio, discussed the workmen's compensation or employers' liability insurance rate as pertaining to the sand and gravel industry.

The threatened increase in freight rates was thoroughly discussed and on motion of Harry Donnelly, seconded by H. B. Hoel, Executive-Secretary Guy C. Baker was constituted a committee with full power to handle the freight-rate question on behalf of the Ohio Association in conjunction with the National Association.

Progress in Mineral Aggregate Freight-Rate Case

"A LETTER FROM MR. SUTTON received this date contains the information that our industry, through its attorney, O. P. Gothlin, is ready to put up a very strong fight against any increase in freight rates based upon those now in effect. This letter states that there is a very splendid co-operation of sand and gravel shippers from all parts of the country, and it is believed by Mr. Sutton that this concerted action will bring about the conditions sought for, both in preventing a curtailment of car service and the imposition of burdensome freight rates. It is indicated that the rate hearing will probably be had this week before the Interstate Commerce Commission.

"The comparative freight movement data received from a large number of our producers has been skillfully compiled in a very graphic form by our extension engineer, R. C. Yeoman, and will most certainly be of very material assistance in convincing the Interstate Commerce Commission of the present unjust discrimination against the sand and gravel industry as a whole." H. C. Huffstetter, President, Indiana Sand and Gravel Producers' Association.

Indianapolis, Ind., June 1, 1920.

Southern Mineral Aggregate Producers Act Through Chamber of Commerce

MEMPHIS, Tenn.—The Southern Road Material and Contractors' Association comprising producers of sand, gravel and crushed stone and of contractors engaged in the building of hard surfaced roads in Arkansas, Mississippi and Tennessee, held a meeting in Memphis recently at the Chamber of Commerce. One of the first official acts of the newly launched body was the seconding, by the executive committee, of a telegram to C. B. Aitchison, a member of the Interstate Commerce Commission, Washington, D. C., asking for a conference with representatives of this organization and the Memphis Chamber of Commerce relative to proper and equitable distribution of open-top car equipment for the handling of road materials. When this date is arranged Thos. B. King and other members will go to Washington to represent the Association in matters pertaining to the distribution of cars and motive power by the railroads.

The Association also accepted the resignation of Elliott Lang, of the Batesville Gravel and Material Co. as temporary secretary and immediately elected him treasurer. Geo. W. Foshee, vice-president of the Allen Gravel Co., another Memphis concern, was elected secretary and manager of the association.

How to Get Railway Cars

THE INTERSTATE COMMERCE COMMISSION on May 25 appointed "terminal committees" at all the more important railway centers, whose duty it is to help relieve the present conditions of freight congestion. Each committee has a chairman who is an employee of the Interstate Commerce Commission and therefore represents the public; the other members are a representative of the state railway commission; a representative of the carriers entering the terminals; and a representative of the shippers.

Duties of Committees

The Commission orders that:

"The committees communicate through their chairmen with the Interstate Commerce Commission and without delay establish co-operative relations with the commission on car service committee now being organized by the railroads at the terminal designated.

"It shall be the function of the terminal committee hereby constituted to see that during the present emergency the Interstate Commerce Commission is kept advised as to the railroad transportation situation in and about the terminal mentioned.

"The committee shall act in an advisory capacity in connection with the operating work of the commission on car service committee of the railroads, and through such committee shall reach the individual railroads in the terminals. The terminal committee should bring to the attention of the Interstate Commerce Commission any matters deemed important, and any matters upon which the exercise of the mandatory powers conferred by the transportation act upon the Interstate Commerce Commission seems desirable or necessary, together with its recommendation as to the specific action to be taken. The committee should work in close contact with the shippers; and should use every effort by study, conference and adjustment to overcome any condition which impedes prompt and efficient transportation.

"The subjects which it is important at this time to investigate and consider and as to which the committee should concern itself are generally:

1. To consider all matters of operation and

City	Commission's Representative	Railroads' Representative	Shippers' Representative	State Commission Representative
Atlanta	C. S. Roberts, Cecil Hotel.	E. W. Sandwich, Supt. Car Service, Atlanta & West Point Railroad.	M. M. Emmert, Traf. Mgr., Coca Cola Co.	
Baltimore	H. C. McAdams, Caswell Hotel.	O. H. Hobbs, Division Supt., Baltimore & Ohio Railroad.	G. S. Henderson, Traf. Mgr., Chamber of Commerce.	
Birmingham	J. B. Ford, Empire Hotel.	E. S. Stovall, General Agent, Central of Georgia Ry.	O. L. Bunn, Secy., Birmingham Traffic Association.	
Boston	F. A. Howard, Quincy House.	E. P. Gardner, Assistant General Freight Agent, B. & A. R. R. Co.	H. A. Davis, Mgr. Transportation Department, Boston Wool Trade Association.	Commissioner Alonzo Weed.
Buffalo	F. C. Groome, Niagara Hotel.	L. C. Corcoran, Chief Transportation Clerk, Pennsylvania R. R.	W. D. Sanderson, Traf. Mgr., Washburn-Crosby Co.	Charles J. Doud, Inspector of Operation, Public Service Commission.
Chicago	T. C. Hays, Planters Hotel.	J. H. Brinkerhoff, General Supt., Belt Ry. of Chicago.	Robert C. Ross, J. T. Ryerson & Son.	Commissioner Frank H. Funk.
Cincinnati	S. J. Mayhood, Grand Hotel.	J. A. Morris, Chairman, Cincinnati Operating Committee.	F. M. Renshaw, Acting Mgr., Chamber of Commerce and Merchants' Exchange.	W. M. Kelley, Inspector, Public Utilities Commission of Ohio (Columbus).
Cleveland	H. A. Adams, Hollenden Hotel.	H. O. Dunkle, General Agent, Erie R. R.	F. H. Baer, Traffic Commissioner, Chamber of Commerce.	I. H. Burke, Inspector, Public Utilities Commisison of Ohio (Columbus).
Dallas	J. A. Lawson, Waldorf Hotel.	J. Munday, Supt., St. L. S. W. R. R.		
Denver	A. G. Green, 436 P. O. Bldg.	A. F. Vickroy, Supt., Union Pacific R. R.	H. Dickinson, Com. Transportation Bureau.	P. Lannon, Colorado Public Utilities Commission.
Detroit	W. D. Anderson, Norton Hotel.	W. D. Trump, Terminal Mgr.	P. G. Findlay, Chairman, Transp. Com., Detroit Bd. of Commerce.	John T. Ross, care Lansing Chamber of Commerce.
Galveston	P. J. Bailey, Panama Hotel.	G. G. Moore, Supt. Terminals, Gulf, Colorado & Santa Fe.	E. H. Thornton, Comr. Association.	
Kansas City	A. P. Glueck, 19 P. O. Bldg., Kansas City, Kan.	W. M. Corbett, Pres., Kansas City Terminal Co.	J. H. Tedrow, Chamber of Commerce, Kansas City, Mo.	Mo. C. B. Bee, Chf. Dept. Transp. Kansas.
Louisville	O. S. Reynolds, 531 E. Ormsby Ave.	J. B. Arbegust, Term. Mgr., Louisville & Nashville.	E. L. German, Traf. Mgr., Bourbon Stock Yds.	J. V. Norman, Attorney-at-Law.
Minneapolis and St. Paul	J. R. Walker, Bellevue Hotel, Minneapolis.	P. H. McCauley, Supt. Transportation, Northern Pacific.	Charles Liggett, care of St. Paul Association.	A. L. Finn.
New Orleans	M. E. Hamilton, Monteleone Hotel.	W. E. Farris, Vice-Pres. and Gen. Mgr., New O. & Gt. N.	P. A. Jordan, Asst. Traf. Mgr., Southern Pine Assn.	Carl Giessow.
New York	B. C. Craig, Herald Square Hotel.	A. J. Miller, Supt. Car Service. Dela., Lackawanna & Western.	A. L. Viles, Gen. Mgr., Rubber Assn. of America.	James Maybury, Jr., Chief Inspector of R. R. Divn., New Jersey Comn. Alfred M. Barret, Deputy Comnr., N. Y. Comn. (1st District), N. Y. City.
Norfolk	O. C. Cash, Victoria Hotel.	W. S. Saunders, Asst. Gen. Fr. Agt., Virginian Ry.	W. A. Cox, Secy., Chamber of Commerce.	
Omaha	John Welsh, 403 P. O. Bldg.	W. M. Jeffers, Gen. Mgr., Union Pacific.	C. E. Childe, Mgr., Traffic Bureau, Chamber of Com.	T. A. Browne, Commr., Neb. Railway Comn.
Peoria	A. C. Breed, 302 W. Armstrong Ave.	S. M. Russell, Gen. Supt., Toledo, Peoria & Western R. R.	J. L. Collyer, Board of Trade.	Hugh S. Weston, Examiner, Pub. Utilities Comn. of Ill.
Philadelphia	F. T. Siebert, 413½ P. O. Bldg.	J. M. Jones, Asst. Term. Supt., Penn. R. R.	Geo. P. Wilson, Comr. of Transportation, Chamber of Commerce.	
Pittsburgh	H. B. Thurston, 401 Jones Bldg.	C. F. Wolcott.	W. O. Moore, Tr. Comr., Chamber of Commerce.	
Portland, Ore.	G. B. Winter, 768 Wasco St.	H. M. Huston, Supt. Car Service, Spokane, Portland & Seattle Ry. Co.	J. H. Lothrop, Sec., Traffic & Trans. Assn.	Fred G. Buchtel, Chairman, Court House Public Service Commission.
San Francisco	T. J. Hicks, Ramona Hotel.	K. M. Nicholes, Northwestern Pacific R. R.	H. M. Remington, Chamber of Commerce.	W. P. Gerry, c/o R. R. Commission of California.
Seattle	J. B. Brown, New Richmond Hotel.	M. Nicholson, Gen. Mgr., C. M. & St. P.	J. D. Mansfield, Tr. Comr., Chamber of Commerce.	T. S. McEachron, New Richmond Hotel.
St. Louis Mo., and East St. Louis, Ill.	A. R. Layman, Statler Hotel.	A. S. Johnson, Gen. Mgr., Terminal Ry.	Chas. Rippin, Tr. Mgr., Mer. Exchange of St. Louis.	Mo. C. B. Bee, Chf. Dept. Trans. John L. Bowlus, Ill. Public Utilities Commission.
Toledo	A. D. Hamilton, Waldorf Hotel.	L. C. Reddish, Asst. to Gen. Mgr., Toledo Terminal.	L. G. Macomber, Cmr., Traf. Bureau, Toledo Commercial Club.	H. M. Gray, Insp. Pub. Utilities Commission of Ohio (Columbus).
Washington, D. C.	R. S. Booth, 619 I. C. C. Bldg.	E. V. King, Gen. Yd. Master, Potomac Yards.	Geo. H. Cushing, 729 Woodward Bldg.	
Youngstown, Ohio	P. McCauley, Colonial Hotel.	C. Bucholtz, Division Supt., Erie.	H. D. Rhodehouse, Mgr. Traffic Bureau, Chamber of Commerce.	C. C. Thorpe, Insp., Pub. Utilities Comn. of Ohio (Columbus).

transportation which will in any way tend to increase the efficiency of car supply, of motive power, of transportation, or to relieve or minimize congestion or delay at the terminal or upon the line.

2. To see that the routing or rerouting of traffic is in conformity with Service Order No. 1 of the Interstate Commerce Commission, and to advise the Commission of violations of the order which may come to the notice of the Terminal Committee, as well as violations of any other Service Orders entered or to be entered by the Commission.

3. To study the embargo situation and make suitable recommendations with respect thereto.

4. To make such recommendations in conjunction with the Commission on Car Service Committee as to the issuance of permits as developments may show to be necessary or advisable.

5. To use every effort to prevent the abuse and misuse of equipment, and especially coal, refrigerator, live stock and grain loading cars; and to use every effort to see that the use of these cars for the time being is confined as far as is reasonably practicable to the primary purposes for which they were built.

6. To use every effort to obtain the most prompt loading and unloading of equipment by shippers and consignees, and to secure the maximum possible loading of cars.

7. To use every effort that orders for placement of cars shall conform to the actual necessities of the proposed movement, and to discourage waste or needless transportation during the present emergency.

8. To cause a reduction in the use of equipment in transfer service when the movement can be made by motor truck, wagon or other means.

9. To keep advised with respect to the situation in the terminal as to operating conditions, including the quantity and efficiency of labor, or lack of switching power, delays in interchange of equipment, delays in placement for unloading and pulling out of loaded cars or released equipment, delays in loading and unloading equipment, delays in movement of cars awaiting billing; bad order cars, condition of motive power and the railroad fuel situation. At port terminals, pertinent advice should be given as to the shipping situation. The committee should also keep advised as to the commercial situation in the terminal as affected by transportation. Reports upon these subjects will be made by the chairman of the committee to the Interstate Commerce Commission daily.

Shippers Must Co-operate

The members of these committees, whose names and addresses are given herewith, serve as a partriotic duty without compensation from the Commission. Therefore it behooves every shipper to give them the heartiest co-operation and assistance, both for the same reason and because it is for their own interests to do so.

Want One National Mineral Aggregate Association

Wisconsin Association Believes Failure of National Associations to Get Together Is Preventing More Effective Work in Freight Rate and Car-Shortage Cases

WITH A RECORD of two years of useful service and perfect harmony the sand and gravel and crushed-stone producers of Wisconsin can not see why a National Mineral Aggregate Association should not exist and be of extraordinary service to the industry at this critical time of threatened freight-rate increases and car shortage.

At a regular meeting of the Wisconsin Mineral Aggregate Association in Milwaukee on May 25 this was one of the chief topics of discussion. President A. J. Blair, Secretary I. M. Clicquennoi and B. H. Atwood all spoke pointedly and earnestly in favor of the combination of the two national associations in the mineral aggregate field.

While the work that the two associations are now doing in the matter presenting the industry's case before the Interstate Commerce Commission was highly commended, the opinion was expressed that a joining of forces and financial resources would add tremendously to the welfare of the industry. A resolution to this effect was unanimously passed and the directors of the association were directed to take whatever steps were deemed necessary to help the cause along.

It was suggested that the secretaries and other officers of the state mineral aggregate associations already formed get together with the officers and directors of the two national associations and see what could be done to bring the two national associations into one organization. It was also suggested that the present extraordinary conditions might justify the calling of a joint convention of all mineral aggregate producers of the country under the auspices of the two national associations.

The rest of the meeting was largely taken up with a discussion of the present freight car situation. John J. Sloan, of the Wisconsin Granite Co., had just returned from Washington, D. C., and reported that many Government and railway officials still seemed unaware of the existence of the mineral aggregate industry. It seemed to be the general opinion that the time is here for putting the industry on the map of the United States, as it has already been put on the map of Wisconsin.

Michigan Sand and Gravel Producers Meet

THE annual meeting of the Michigan Sand and Gravel Producers' Association was held last week at the offices of the United Fuel & Supply Co., Detroit, Mich. Producers from every section of the state were present. Reports were to the effect that due to car shortage for the transportation of sand and gravel, building operations were being seriously held up. Officers for the ensuing year were elected as follows: President, C. N. Ray, of Detroit; Vice-President, G. A. Glarum, Evart; Secretary and Treasurer, George L. Earle, Detroit.

Rates on Glass Sand

A FINDING OF UNREASONABLENESS and an award of reparation have been made in a report on No. 10663, Charles Boldt Co. vs. B. & O. et al., opinion No. 6124, I. C. C. 259-63 by Interstate Commerce Commissioner Eastman, as to rates on glass sand from Ottawa, Ill., and points grouped therewith to Huntington and West Huntington, W. Va., between November 1, 1917, and October 17, 1918. The report follows the recommendation of the examiner who heard the testimony, with minor exceptions. The rates found to be reasonable are $2.40, $2.80 and $3 per ton. The varying rates are due to the increases allowed by the Commission and General Order No. 28. Under the latter order the rates went as high as $4.40 a ton, but they were subsequently reduced to enable Huntington glass manufacturers to meet the competition of producing points north of the Ohio River.

Great Lakes Sand Business Threatened

CLEVELAND, OHIO.—Building and road construction in Ohio will be seriously affected if a proposed bill requiring licenses before sand and gravel can be brought from Canada is passed by the parliament of Ontario, members of the Great Lakes Sand and Producers' Association here say.

The bill has passed two readings, according to E. A. Roberts, secretary of the Cleveland Builders Exchange.

Ostensibly drawn to protect the beaches of Pelee island, the bill gives to the lieutenant governor full discretion in permitting sand to be taken from the shores and bottom of Lake Erie, Lake Huron and Lake Ontario. Between 250,000 and 300,000 tons are brought to Ohio from Canadian waters annually.

The Design of Sand and Gravel Screening and Washing Plants

I. Introduction—An Engineering Problem—Considerations Affecting Location and Method of Operation

By Frank M. Welch
Chief Engineer of The Greenville Gravel Co., Greenville, Ohio

F. M. Welch

THE SAND AND GRAVEL INDUSTRY is divided into three distinct classes, namely lake, river and bank. The large lake dredges and pump boats, sending thousands of tons of sand and gravel daily to shore by means of barges or through pipe lines supported by pontoons, can be seen on all of the Great Lakes and on many of the smaller ones. The river plants which excavate the material from the river beds by means of ladder dredges, clam shells or pumps are found operating in or near every large river town where marketable material is available. Bank plants of every conceivable size, design and stage of efficiency are nearly as numerous as are the gravel deposits. Inasmuch as the writer's experience has been principally in the development of the bank plant, that class will constitute the main theme of this discussion.

Bank Gravel Developments

The development of the modern sand and gravel screening, washing and crushing plant for bank deposits started about twenty-five years ago. The industry has developed with great variations in different localities. Although the nature of the raw material in the banks is in general similar, and the market requirements fulfilled by it are not unlike, yet the methods of excavation, transportation, elevation, screening, washing, crushing, and loading have become very numerous and diverse.

However, in this industry as in every other, we find the inquisitive, ambitious and progressive producers, who have carefully studied the merits of all of the processes, have benefitted by the experience of their neighbors, and have originated, improved and perfected many steps in their operations. These most successful producers, who are always one or two jumps ahead of their competitors, however, do not eliminate all but one method for each step in the production of clean and sharp sand and gravel. On the contrary they find that among the great variety of methods, each meets certain requirements and is the most suitable and efficient under certain local conditions. Inasmuch as local environments, market conditions and shipping facilities present such a variety of problems, it is fortunate that there is a large variety of schemes for accomplishing and completing the many steps in the production of washed, screened and crushed material.

Editor's Note

AFTER THE REMARKABLY favorable reception of the series of articles on the design of rock-crushing plants by Brownell McGrew, in Rock Products of last year, the editor set about finding the one man in the sand and gravel industry who could produce a similar series of authoritative articles on the design of sand and gravel plants.

Frank M. Welch was selected as that man. He is an engineer of experience both in the design and erection of plants. For several years he was sales engineer of the Webster Manufacturing Co., Tiffin, Ohio. He is now chief engineer of the Greenville Gravel Co., probably the largest operator of sand and gravel plants in the world.

Recently the Greenville Gravel Co. decided to extend its activities to include engineering advice and designing for other sand and gravel producers, and Frank M. Welch is the man through whose hands this work passes. Consequently, from his wide and varied experience, he writes as one of the foremost experts on the design and operation of sand and gravel plants.

A Real Engineering Problem

The fact that every step in the modern production of sand and gravel on a large scale for commercial purposes requires heavy machinery, extensive buildings, elaborate concrete work, efficient track arrangements and a definite plan for the disposal of stripping and refuse, the entire design and construction of such a plant as well as the locating and the preliminary steps have become an engineering problem. The requirements, and the selections from which to choose the most efficient solutions are all so numerous and the demand for larger tonnage, cleaner and better graded material is so ever increasing, that the design and construction of sand and gravel washing plants, has become a branch of engineering in itself.

The complete designing of a large modern plant, which is capable of meeting present day market requirements, if handled in every detail by one engineer working alone, requires several months. Likewise a discussion covering the entire field and commenting upon the various accepted methods for each operation in the process will require several pages. It will be most logical to first take up the preliminary problems as they confront the prospective producer, after which will follow a discussion of the successive units in the plant design, taken up one after another in the form of a flow sheet: that is following the same order as does the material in passing through the plant.

General Outline

The first and foremost, and generally the most difficult problem which confronts the prospective producer, will not be discussed here because it is not an engineering problem—that of financing the proposition. The second in importance, that of location should be given most careful consideration, for a misstep will handicap the operation from the start, regardless of how carefully the balance of the features may be worked out. This question will therefore be dealt with first. The third problem presenting itself to the prospective producer is that of capacity and its discussion will be taken up after that of location. Experience has pointed out many universal as well as local and market

conditions which affect the determination of the capacity. From this point the analysis will follow the flow sheet and will take up the subjects in the following order:

Stripping,
Excavating,
Transporting,
Feeding,
Elevating,
Scalping,
Primary Crushing,
Secondary Crushing,
Screening,
Washing,
Distributing,
Storing,
Loading,
Shipping,
Type of Building,
Power.

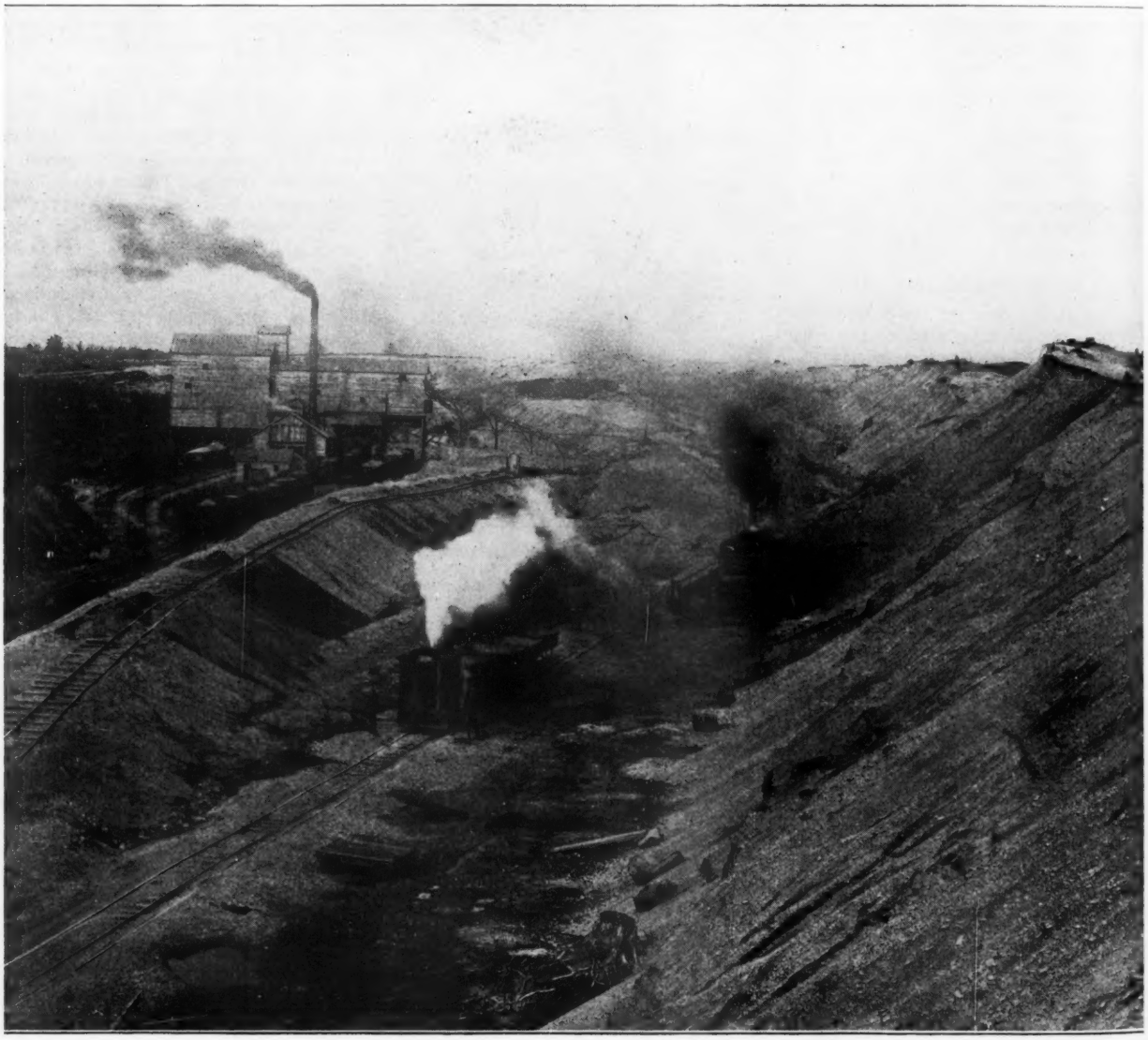
Although this order does not exactly parallel the flow sheets of all plants, it follows the average of the majority.

Location—Market Conditions

If the question of location could be solved by merely finding a bank of uniformly good gravel which could be acquired at a reasonable figure, this preliminary would be easily disposed of, as in many parts of the country excellent gravel banks are very numerous. Many of them have never had a shovel full of material removed from them, and many will not have for a long time, because of their poor location for commercial purposes.

Regardless of the quality of the bank, if it is not within reach of a lucrative market, it is valueless, because the freight rates will necessitate a prohibitive delivered price. In some sections competition defines forty to fifty miles as the limiting distance of a plant from its market, while in others available material is so scarce that it has been shipped two or three hundred miles. The writer visited a plant a few years ago, where the bulk of its output was being shipped nearly across an adjacent state to a community where no gravel existed within hundreds of miles, the freight rate being $3.00 per ton. If this plant is still serving the same market in spite of the present greatly increased freight rates, gravel must be a valuable commodity at this destination.

Even though an excellent bank is within range of a large market, competition is a factor to be considered. If there are other modern plants closer to the market than the proposed site, they are in a position to undersell the prospective plant at times when the supply exceeds the demand. Even if your com-



petitors are compelled to ship as far as you to reach the market, it is not advisable to locate another plant in this community unless the present plants are unable to supply the demand either in quality or quantity.

In selecting the site, one having several outlets to good markets, or one so located that it can readily ship over more than one railroad, has naturally a great advantage. Even though there are several plants operating in a community, if few or none of them are located on the railroad which would serve the proposed plant, the latter would ordinarily be worthy of development.

An ideal location is within the shipping limits of a large city. In such a location, all the advantages of the rail trade are realized and in addition, the city truck and wagon trade. It eliminates the necessity and additional expense of operating and maintaining local trade bins in the city and permits selling material at retail prices at the plant. If the plant is properly designed with this feature in view, truck loading can be carried on without extra expense and without interfering with the rail shipments. In certain communities there are other advantages of location such as boat and traction line shipments.

Location in Relation to Operation

After the general geographical requirements have been determined, the bank itself from the geological viewpoint should be carefully tested and proved to be of suitable depth, of marketable material throughout, without a prohibitive overburden, and of sufficient extent to justify the development of the property. A working face having an average depth of at least 25 to 30 ft. should exist, and the higher the face can be found, the more economically it can be excavated. A location where the overburden is very thin has the advantage of cutting to a minimum the very expensive job of stripping. If an average of but 18 in. or two feet of soil covers a bank presenting a working face of 30 or 40 ft. stripping may be eliminated altogether, depending upon the washing process in the plant to thoroughly clean the material.

The character of the deposit also has a very important bearing on the marketability of the product. For instance gravel (or crushed boulders) is ordinarily a more valuable constituent than sand, as sand is more widely distributed and many markets which exist for gravel or stone are already over-supplied with sand. On the other hand the reverse of this situation sometimes exists. Consequently it is important to know at the start whether the deposit under consideration will run 50 or 75 per cent gravel or stone, and whether the principal market requirements are for sand or gravel.

If a large plant is contemplated, unless a very large acreage is acquired, options should be obtained on adjacent property where equally good deposits are located. In testing the material on the proposed site, wells should be sunk to the bottom of the marketable deposits or at least far enough to insure a high working face. These test holes should be sunk first in each corner of the property then near the center, after which enough holes should be interspersed that adjacent holes show such a similarity of material as to determine the nature of the entire deposit.

One company which operates several successful plants thoroughly tested every gravel deposit along a railroad between two cities thirty miles apart before determining upon the site of a new installation. Through their knowledge and experience they had first determined that an excellent commercial opportunity existed along this particular railroad. They found that several farms on both sides of the railroad between these cities contained gravel deposits. After the tests were made and options obtained on some of the most desirable farms, careful comparative records were studied from the standpoint of acreage, depth, overburden, topography, grading, purchase or lease prices on each as well as on adjacent deposits, before the final location was decided upon and the property acquired.

(To be continued)

Sulphur in Coal and Coke

By Alfred R. Powell*

AN INVESTIGATION has been made of the applicability to a variety of coals, other than those from Illinois, of the Powell and Parr method of analysis for the forms of sulphur in coal.

The method of analysis gave excellent results when applied to these coals. In the determination of pyrite, the iron-sulphur ratio checked in every case with the theoretical. After the extraction of the pyrite and sulphates, the remaining sulphur was proved to be organic in nature.

This work indicated that sulphur exists in coal in three typical forms: pyrite or marcasite, sulphates, and organic sulphur. A study of the changes which these forms undergo during coking has been made on a variety of coals, and the following five classes of reactions established.

First. Complete decomposition of the pyrite and marcasite to ferrous sulphide, pyrrhotite, and hydrogen sulphide. This reaction begins at 300°C., is complete at 600°C., and generally reaches its maximum between 400 and 500°C.

Second. Reduction of sulphates to sulphides. This reaction is complete at 500°C.

Third. Decomposition of the organic sulphur to form hydrogen sulphide. From one-quarter to one-third of the organic sulphur is so affected in the primary decomposition, but the by-product gases traveling through the coking mass increase this reaction to as much as one-half of the organic sulphur present. Primary decomposition is most active below 500°C.

Fourth. Decomposition of a small part of the organic sulphur to form volatile organic sulphur compounds. The greater portion of these find their way into the tar. This decomposition occurs at lower temperatures of the coking process.

Fifth. Disappearance of a portion of the ferrous sulphide and pyrrhotite, the sulphur apparently entering into combination with the carbon. This reaction seems to be most active in the neighborhood of 500°C and higher.

The organic sulphur not accounted for by the above reactions undergoes a decided change in character between 400° and 500°C. and shows none of the properties of the original coal sulphur.

From these experiments, it would not seem that the relative amounts of pyrite and organic sulphur in the coal have much effect on sulphur distribution during coking.

Methods for changing the sulphur distribution were studied so that the minimum amount of sulphur would be retained in the coke. A complete study was made of the efficiency of hydrogen and gases containing hydrogen as desulphurizing agents when passed through coal in the process of coking.

The effect of the hydrogen on the removal of sulphur from coke was very noticeable, in some cases nearly all of the sulphur being removed as hydrogen sulphide during a period of three hours. The ordinary sulphur coking reactions were affected in two ways by the passage of hydrogen through the coking mass; (1) the pyrite was caused to decompose at a much lower temperature; (2) the coke sulphur, which is presumably in combination with carbon, was eliminated at an almost constant rate at the higher temperatures of the coking process.

The size of the particles of coal did not seem to affect the rate of evolution of hydrogen sulphide.

For gases containing hydrogen, the desulphurizing efficiency seemed to be proportional to the partial pressure of the hydrogen.

(U. S. Bureau of Mines, Reports of Investigations.)

*Physical Organic Chemist, U. S. Bureau of Mines.

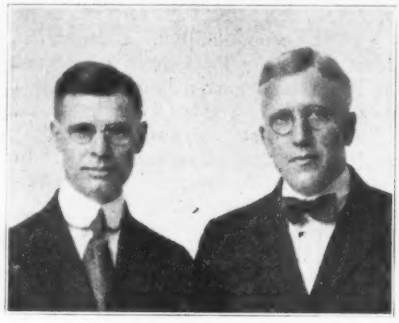
New Sand and Gravel Plant at St. Paul

THE UNITED MATERIALS CO. is the name of St. Paul's (Minn.) newest sand and gravel enterprise. F. J. Morse is president and Bernard S. Andrus is treasurer and general manager.

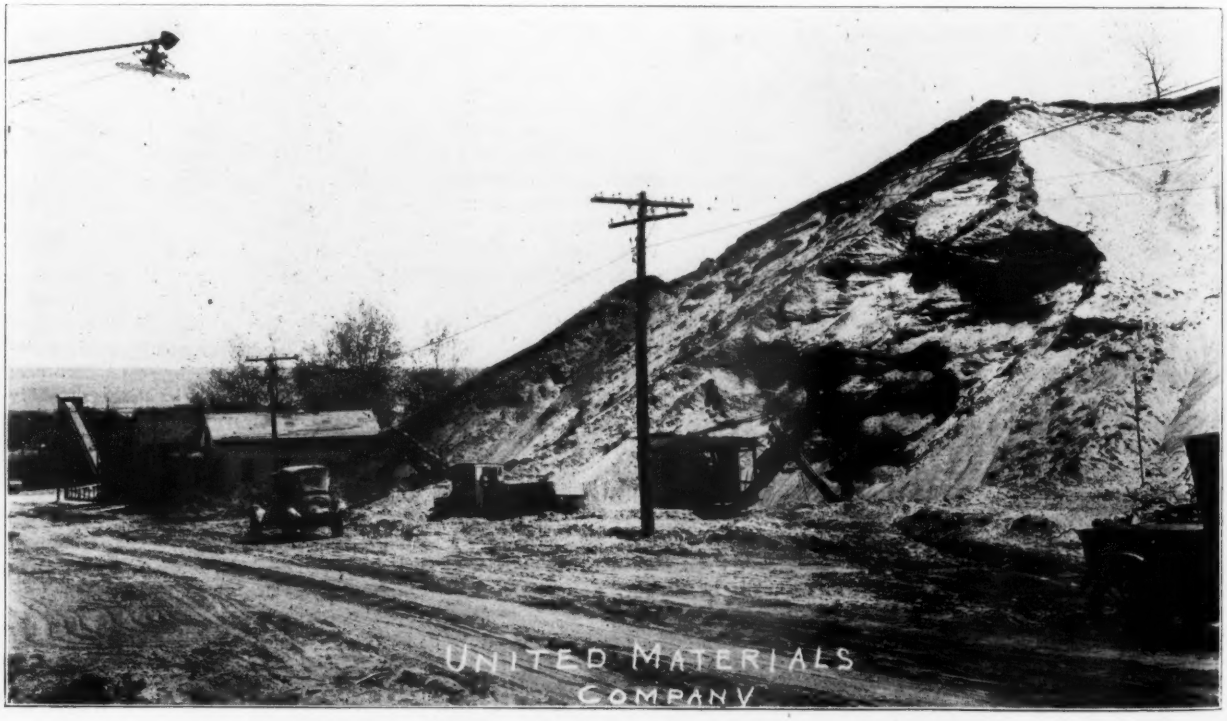
A new and unusual feature of the operation is the use of motor trucks for handling the material from pit to plant, a distance of about 350 ft. Allowing $3 per hour for the operation of the trucks, this operation averages 7 cents per cu. yd. Mr. Andrus says: "We find this method of hauling to the plant satisfactory for the reason that we can use the trucks for taking away stripping from time to time and can use them for making city deliveries in case of delays; and we can place as many trucks in service as required to keep a sufficient supply of sand and gravel coming to the plant. The principal reason for adopting the trucking plan was on account of having to cross a street with considerable automobile traffic and street car service. We started operations with a caterpillar tractor and trailer wagons but found it dangerous and cumbersome to cross the street."

The plant is located on the Chicago Great Western Ry. and on a brick paved highway 3½ miles from the city of St. Paul. The general office is at the plant at South Park, South St. Paul. Offices are also maintained at St. Paul in the Endicott Bldg., and in Minneapolis at The Builders' Exchange.

The plant is a dry-screening operation using Alwart vibrating screens. There are two series of screens which take the material both ways from a 2-in. grizzly screen at the top. One series of screens separates the material after passing the grizzly into material from ¼-in. to 2-in. and everything below ¼-in., this making concrete sand and highway concrete gravel, the material being discharged from the screens into two large bins. The other series of screens takes the material after passing the grizzly and separates it into medium gravel for reinforced concrete work, roofing gravel, plaster sand and torpedo sand. These materials are discharged into the four smaller bins. A



Bernard S. Andrus and F. J. Morse

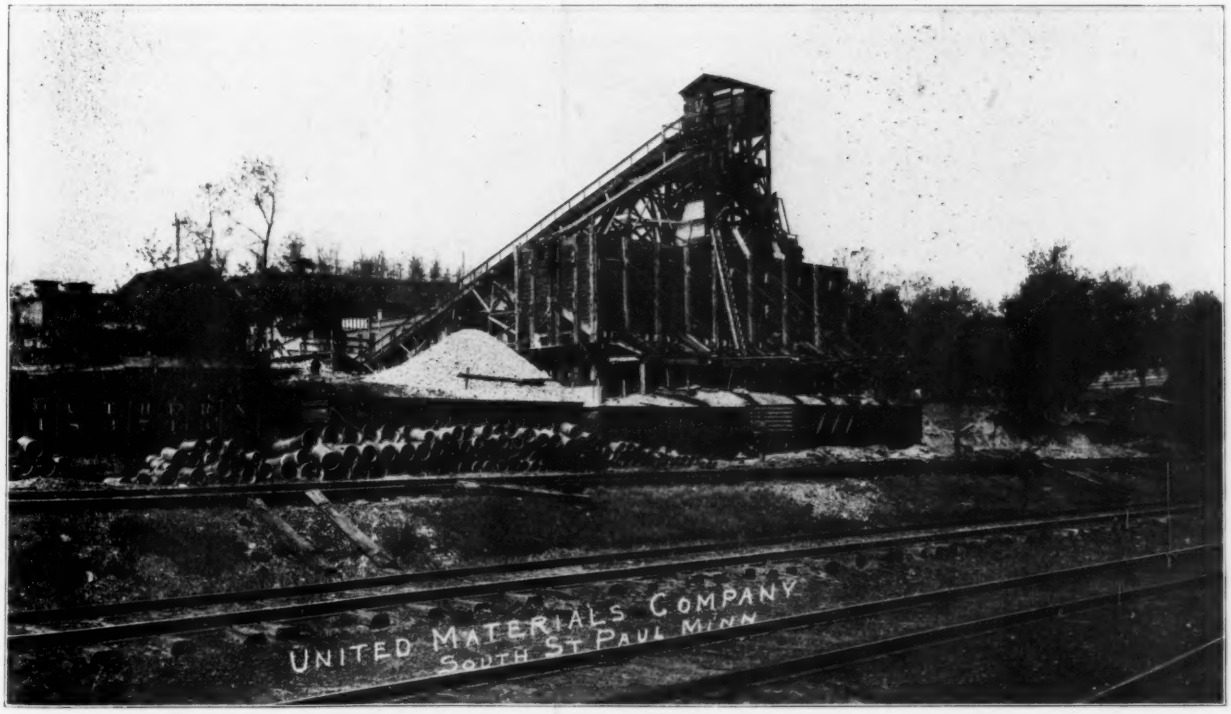


Gravel pit of the United Materials Co., St. Paul. Upper view shows character of deposit

Plant of the United Materials Co., showing location on railroad, highway and river

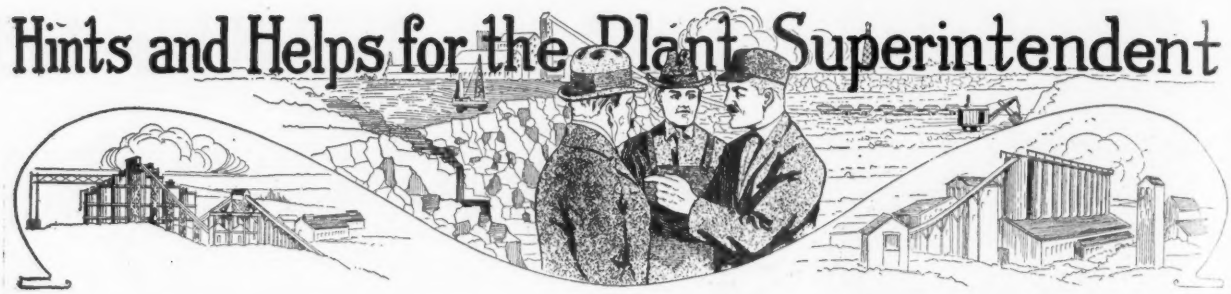
crusher is being added to take care of the over-size pebbles. The capacity is 1,000 cu. yd. per day.

This company also deals in other building materials, including paint, and makes estimates for cut-stone and granite work. A fleet of 10 five-ton motor trucks are used in connection with the gravel plant.



Near view of plant showing railway car-loading facilities

Hints and Helps for the Plant Superintendent



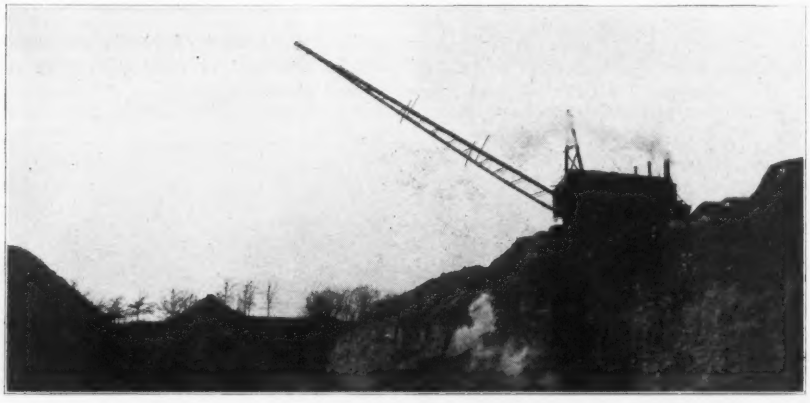
Drag-Line Machine for Quarry Stripping

THE TWO VIEWS BELOW show how W. M. Spencer uses a drag-line excavator for stripping his crushed stone quarry at Independence, Mo. Mr. Spencer is an ex-contractor, and has an intimate knowledge of earth-handling machinery, based on many years' experience. He believes that he has the most economical stripping operation it is possible to devise.

The drag-line machine has an unusually long boom—90 ft. The quarry face is long and straight as the views show. Deep-hole blasting and steam shovel operation are the quarry excavating method. The loading tracks parallel the quarry face and the outgoing track to the plant is in the form of a Y at about the middle point of the quarry face.

The two views show how the drag-line scrapes off the stripping and deposits it in a bank parallel to the quarry face. This bank, with the quarry face, forms a trench, blanketing the blasts, thus increasing their effect and preventing flying rocks from doing damage. The economy of the stripping operation is evident at a glance, since the one drag-line operator is the only regular workman on this important detail.

With a smooth topped ledge of stone this method of stripping would be ideal. At this particular quarry deep seams in the surface of the ledge make it necessary to do much hand shoveling before the limestone is actually clean enough to blast, but the economy in the drag-line method as a starter makes this latter operation possible even in a crushed-stone quarry.



Drag-line with 90 ft. boom stripping a limestone quarry in Missouri

Method of handling the stripped material by piling it opposite the quarry face

Principles of Sand and Gravel Pumping

"THE GENERAL PRINCIPLE of pumping sand is just the same as pumping water. You are limited to the height you can raise material above water to your pump, and theoretically you are limited to something like about 32 ft. That is theoretical (atmospheric pressure), but when it comes to actual pumping, don't undertake to go over 28.

"Try to hold your suction gauge around about 25 or 26. Along in there is the safe point, because if you are running at 28 and should happen to catch a good-sized boulder on your nozzle you choke off your inlet. Your suction will run up above your limit and as a rule before you can stop your pump or shut it off, you have broken your suction and possibly your pipe line, or the material settles in the pipe line.

"When this happens you have got about one chance in ten to kick it out. It is usually a case of uncoupling your pipe line and cleaning it out a piece at a time, so that it pays to work on a margin of safety. That margin of safety should be from 25 to 28 lbs. (pressure) to work on, and while you get more material working at higher pressure while working, yet you lose more time in the long run.

"On your discharge you are almost unlimited in a way. There is a certain distance to which you can go economically. Beyond that, if your conditions require you to go further, put a booster in the line.

"If you are working with electricity, your electric power wires come out to your boats along the line of your pipe line, which is carried on pontoon boats, your electricity stops at this first boat and connects up with that motor continuously right onto your other boat and its motor, and the one operator controls both motors, although they may be 1,000 ft. apart.

"Under ordinary conditions it will cost you about $500 more for that type of installation, but you can readily see that what you would have to pay for a man

to operate the other motor would make up for the difference in a very short time.

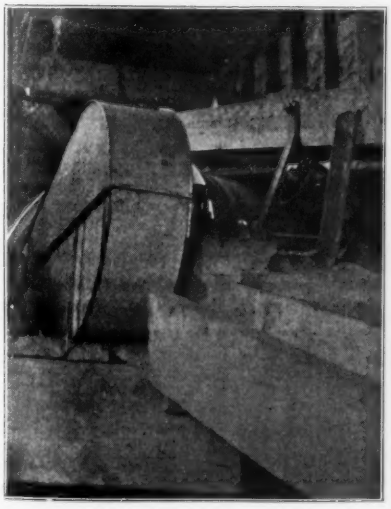
"Once in a while you will have a circuit breaker kick out or something of that kind on the motor where there is no attendant. Then, of course, you are up against a shutdown until you go back there and take care of that, but if you watch it and keep the breaker at the motor where the man is operating so that it will trip before the other one, you will never have that trouble.

"Of course, where you are operating a steam or a gas engine you can't do that. When operating with a motor it is advisable to use the variable speed motor and operate it 90 per cent of its normal speed. You are using a little more current, while you are running than you would if you were running at full capacity, at full speed, but you will save time in the long run, because when you get an overload in your pipe you have got a reserve, a little bit more speed to step on, just as you would in the case of your automobile when you get on a hill. It will save a good deal of time in not having to lift your nozzle, the inlet to your pipe line, to get rid of an overload in your pump."—R. SNODDY, Manager, Coon River Sand Co., Des Moines, Ia.: at convention of the National Association of Sand and Gravel Producers.

Troughed Conveyor Frame

THE CONVEYOR GALLERY of the ordinary sand and gravel or crushed stone plant often is the collecting place for numerous chunks of rock and pebbles which roll off the inclined belt conveyor. Only occasionally does one find a belt conveyor even provided with side boards to prevent the stones from rolling off.

The belt conveyor frame shown herewith, at the sand and gravel plant of the Blue Limestone Co., Minneapolis, Minn., is provided not only with 2x8-in. side boards, but with a trough below. This construction keeps the floor of the conveyor gallery free of all litter caused by the falling off of the material conveyed, and certainly adds much to the neatness and attractiveness of the plant.



Troughed conveyor frame

Moving a Big Jaw Crusher Forward

IF YOU HAD a 84x60-in. jaw crusher weighing around 200 tons, mounted on a concrete foundation, and it wasn't quite in the right place, you might hesitate about moving the crusher nearer the rest of the plant, or the rest of the plant nearer to the crusher.

The illustrations show how a crusher of this size was moved about a foot nearer to the rest of the plant without any further new construction than a cantilever extension of the concrete foundation. Of course this extra foundation is well reinforced and tied into the older concrete. The interesting feature is that the job has been done and that it is satisfactory.

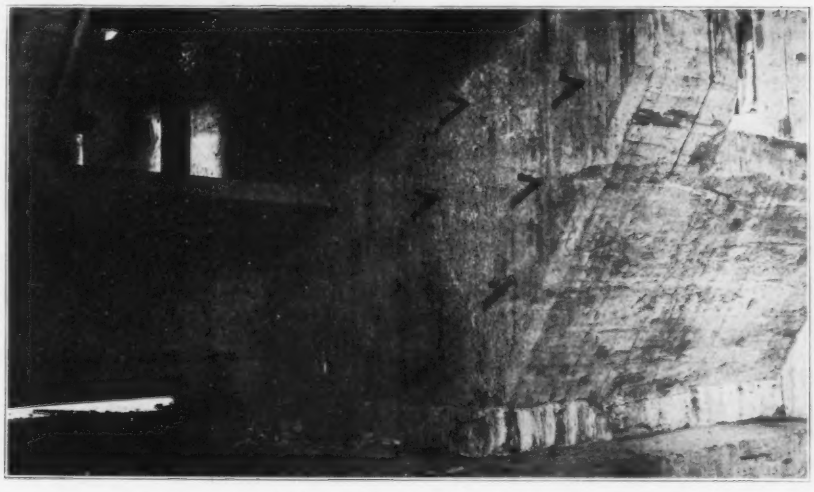
The trouble was that the crusher as a primary breaker was set back just a trifle too far to feed properly into a 20-in. gyratory secondary crusher, which is below and in front of the jaw crusher. The two crushers were designed as a unit with their foundations and feeding arrangement. The easiest way out of the trouble was to move the big jaw crusher forward, as illustrated.

The crusher building had plenty of head room and was provided with an overhead traveling crane capable of handling any part of the big crusher, so that the actual moving operation was comparatively simple.

Question Box

GOT a problem you want help on? Send it in. We will help.

Big jaw crusher mounting that was changed



Concrete foundation of crusher showing cantilever offset

Southern Crushed Stone Company Building Lime Plant

The Ladd Lime and Stone Co., Which Is Now Operating a Large Commercial Stone and Agricultural Limestone Plant, Will Add Lime Plant

AN INTERESTING example of a southern quarry industry which has been reorganized and worked over by its present owners is that of the Ladd Lime & Stone Co., Cartersville, Ga. At present an entire lime and hydrating plant is under construction. At the time when visited in March the foundation for eight kilns had been completed and the steel of the hydrating plant was being placed. It is expected that the lime plant will be completed some time this fall and after that time the large stone crushing plant will really be subordinate to the lime plant operation. Richard K. Meade, of Baltimore, Md., is designing engineer for the lime plant.

The quarry is very unusual in that the stone has an angle of dip of about 15 degrees in places and the face is 198 ft. high. One large ledge which runs practically a pure dolomite will be used for the kilns. At the time when the quarry was taken over by this company the quarry face was being worked on an incline and the overburden had been shot down with the stone. Since then the overburden has been removed separately and the face is being straightened up.

The quarry is hand-loading operated and is sufficiently high above the plant that cars may be delivered down grade without locomotive power. The initial crusher is a 27-in. gyratory and the recrushers are two No. 9 and three No. 5 gyratory crushers. The sizing is done in two 60-in. by 18-ft. cylindrical screens.

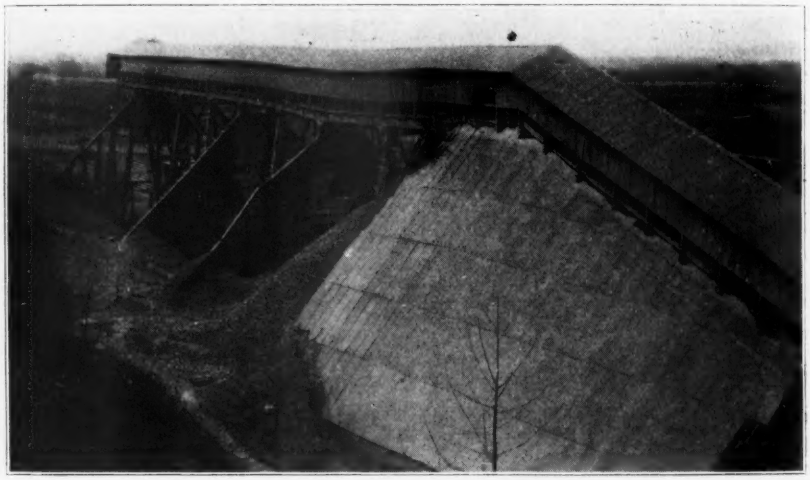
An article on page 32 of the June 21, 1919, issue of Rock Products gives a more detailed description of the crushing plant at that time.

All ¾-in. down material is fed to a coal burning drier in the agricultural limestone department. When there is a demand for roofing gravel this is separated at the ½-in. point. It is claimed that it is profitable to dry the roofing gravel, for it gives a much more uniform product and brings a better price. All other dried material goes to a large Sturdevant pulverizer to be ground for agricultural limestone.

One of the big features of the Ladd Lime & Stone Co. is its covered storage of 20,000 tons. A conveyor belt arrangement provides so that concrete stone may be taken from the loading bins and delivered to the storage. A return belt to the cars is fed from underneath the storage. A large bin is also provided for storing the pulverized stone.

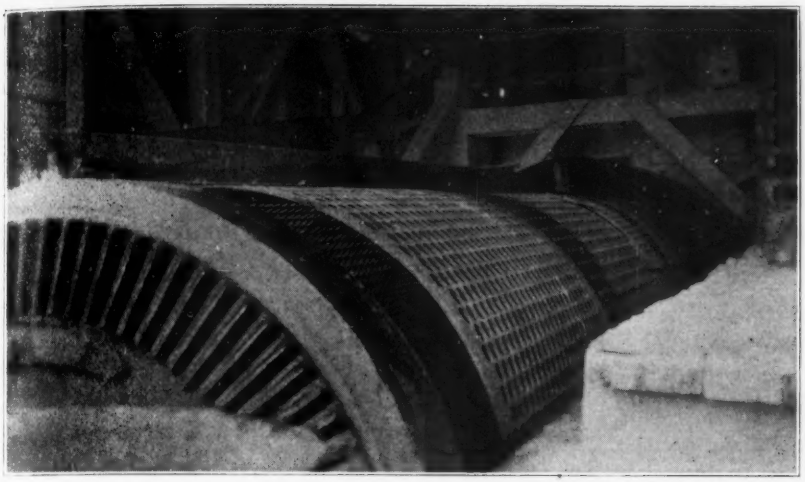
This storage has not been used during the last six months but is now to be rebuilt and made more permanent. The facilities for storing the pulverized agricultural product will be improved by the installation of new conveyors and elevators.

In the early working of the quarry considerable stone was wasted with the overburden. This is all in a large pile at the foot of the quarry and amounts to thousands of tons. It is planned to rework all of this and save the good stone. It is believed that the per ton working charges will not be as great as it would cost to drill, blast and crush a ton of



The stone storage which is to be equipped for use again—the covered section is used to store agricultural limestone

The plant of the Ladd Lime and Stone Company at Cartersville, Ga.



One of the large cylindrical sizing screens

stone from the face. A home-made stone washer consisting of a 72-in. Gilbert screen and inside water attachments has been installed to clean this product.

This small home-made washer will not be as complete as some of the larger ones, but Mr. Backus, the general manager, is confident that it will turn out just as clean a stone. With its use the stone will have to be sized and one size washed at a time.

An abundance of water can be easily obtained and by its use this waste product will be made into valuable commercial crushed stone. The amount of dirt mixed with the stone is small and since the reworking will be done by hand practically all of the dirt and fine material will be removed. It will be possible to work the material down hill and so the operation will not be expensive.

With the completion of the lime and hydrating plant the Ladd Lime & Stone Co. will be one of the largest stone operators in the South. L. J. Backus is vice president and general manager of the company.

Alignment of re-crushers so that they may be driven from one shaft

A view of the quarry face showing the angle of dip of the rock, the type of drill and the different lengths of bits used

A One Hundred Per Cent Increase in Stone Rates Held Reasonable!

THE INTERSTATE COMMERCE COMMISSION has dismissed No. 10597, Calumet & Arizona Mining Co. et al. vs. Director General, opinion No. 6145, 57 I. C. C. 332-6, holding that rates in effect during federal control on copper ore in carloads from Bisbee to Douglas, Ariz., and on lime rock from Forrest, Ariz., to Douglas, were not unreasonable or otherwise unlawful. The complaint related wholly to rates over the El Paso & Southwestern. It alleged that they were in violation of sections 1 and 3 of the act to regulate commerce, and section 10 of the federal control act. The complaint grew out of the operation of the rule for the disposition of fractions contained in General Order No. 28. A rate of 20 cents per gross ton on copper ore, which had been in effect for 10 years, was increased to 30 cents, and a 25-cent rate on lime rock from Forrest to Douglas was increased to 50 cents. Complainants protested against these advances from 50 to 100 per cent, and the Arizona sub-committee of the Division of Traffic of the Railroad Administration recommended a reduction in the copper ore rate to 25 cents. This recommendation was denied. The rates, having been initiated by the President, were subject to the jurisdiction of the Commission, although wholly applicable in Arizona. The complainants offered comparisons with rates on like commodities as far away as Montana on the theory that, practically all the railroads being under federal control, such comparisons were permissible. They also laid stress on the fact that the El Paso & Southwestern earnings for 1918 were 132.3 per cent of its standard return. By way of answer to that, Commission Daniels, the author of the report, said that the earnings for 1918 reflected the increased volume of traffic, particularly of copper ore and bullion, which resulted from war-time activities, and said that the proper measure of the rates assailed should not be determined solely with respect to the unusual conditions that obtained during that period. He also pointed out that in 1919 the El Paso & Southwestern earned only 72.7 per cent of its standard return.

Freight Rates on Agricultural Limestone High Enough

Why It Behooves the Railways Not to Discourage This Vitally Important and Fast Growing Industry

By W. S. Halliday

Manager, Soils Department, Waukesha Lime and Stone Co., Waukesha, Wis.

THE ARTICLE WHICH APPEARED in Rock Products of March 13, 1920, under the heading of "Argument for reducing freight rates on agricultural lime works both ways" was interesting from two standpoints; first, why was it written, and second, in whose interest was it written?

From years of experience in this line, I believe that to place a proper and just rate on agricultural limestone, crushed stone, sand and gravel, one must have a thorough understanding of their manufacture, their uses and purposes, and the conditions surrounding the materials and their manufacture.

The article referred to asks the question, "If the farmer actually realizes from 100 to 500% profit from the use of limestone, why in H——L should he not be willing to pay the producers from 10 to 25% profit without howling?" I would like to ask if any one ever heard a farmer who was an actual user of limestone admit the improvement referred to? This statement comes from producers, not users, yet the users will admit that there is a value, and I am willing to admit that there are many advantages of which the farmer is not conscious in the way of improved physical conditions of his soil, etc.

The question, however, is easily answered. The farmer does not object to paying a reasonable profit, and he knows very closely what the price should be, through the agricultural schools and the manufacturers of portable machines. The farmers are well informed as to the cost of production of this material in nearby localities where they have deposits (perhaps on their own farms), and when the price of the material with freight added reaches a point beyond where they can produce it for themselves, the manufacturer stops shipping and the railroad stops hauling.

The comparison made in the article referred to, comparing agricultural limestone with farm machinery, commercial fertilizer and live stock is unreasonable on account of the conditions governing. The comparison is unjust.

It is however true that farm machinery assists the farmer in saving labor, but it has no power to increase his crop yield, and while the railroad gets the haul in they get no resultant haul out, as no increased tonnage has been the result.

Farm machinery is developed as an industry and is manufactured for a profit. The cost of production is figured and a satisfactory profit added; then comes the selling cost, the agent's profit, and the transportation charges, which are all added, and the result is that the total gives the price that the farmer must pay.

Commercial fertilizers are manufactured along the same lines, and disposed of at prices that will take care of nearly any kind of a freight rate.

Live stock is purchased by the packers, and they generally see that the farmer pays the freight. To prove this statement one has only to be familiar with the prices paid to the farmer, and the prices you are paying at your local market for the same product, with all by-products still in the hands of the packers for further profit. It matters little what rate this is as the farmer will always have to pay the freight, and the lower the freight the less he will get for his live-stock.

Rock Products in Class by Themselves

Agricultural limestone, as well as all crushed stone, sand and gravel are peculiar commodities and should receive from the rate-making body entirely different consideration and treatment.

These products are all low priced, cheap commodities and must on account of conditions remain cheap no matter what they may return to the user in estimated value.

These materials are found in all parts of the country in greater or less quantities, and in poor, medium and excellent grades.

Portable machinery is manufactured for putting these materials in useable form at the points where it is to be used or near by; this can not be done nearly so cheaply as by the manufacturer operating a large stationary plant with permanently equipped machinery of a larger type, but it is possible, and when the cost of the manufactured material plus freight reaches a point beyond which the farmer knows that the material can be produced for at the point of consumption, the manufacturer and railroads lose, and the home manufacture begins.

These conditions are not imaginary but are facts, and in some places on account of the present freight rates this sort of thing is even now taking place.

Just at present I have a friend who is or rather has perfected a portable machine for the crushing of gravel and putting it in a form for road work; the machine moves under its own power, and can be placed in a pit beside the road and the road material prepared right at the job, at points where the material can be had and the freight rates make shipping out of the question.

I trust that I may not give the idea that I am in favor of portable grinding. Far from it, for as I have stated before the materials can be manufactured in a large plant at a much less figure, but what I am doing is giving you the facts as they really do exist, and what will inevitably happen unless the manufacturer and railroads keep within the bounds of reason.

The last increase in freight rates was claimed to be 25% on these commodities, yet on account of the material being hauled on a mileage basis there were points in our state where the increase was over 60%. On account of the price of the material and the class of goods, the former rates were all that they should have been. There are places in our state at present where the freight on a car of agricultural limestone is in excess of the cost of the material.

Were it possible for farm machinery and commercial fertilizer to be manufactured at the point of consumption, the railroads would at least haul the raw material in, but with limestone, sand and gravel, this is not possible as the raw material is there, and needs no hauling, therefore the manufacturer and the railroads both lose, and the farmer too loses in the end.

Will Reduce Agricultural Development

So long as the farmers can purchase a manufactured product at a price that is reasonable, and the freight rates are reasonable, more and more will do so; but when the material reaches a point in price and freight which they know is

too high, and the agricultural authorities know is too high, the farmers will discontinue buying. But it will take a long time for them to get together and actually produce the material for themselves, because it is hard to unite them, and harder to get them to act; and in the meantime soil depletion goes on, a falling off of production continues, and all lose.

If the railroads are interested in the development of agriculture in this country, and they must be for their success or failure depends ultimately on this business, it would seem only reasonable that considering the prices for which the material is sold, and the general conditions surrounding the manufacture, that any material entering into either soil or road building should be carried at the lowest rate possible.

Because a few city agriculturists have large farms with superintendents, maintained as toys for their amusement, and with plenty of money earned elsewhere to care for the deficit from year to year, an imaginary farmer has been born in the eyes of the city masses. To live and deal with the average farmer, or rather the actual farmer, you will find him very much as of old, with the exception that he is learning more about the care of his soil, and improving through increased soil fertility his general condition.

The farmers are realizing more and more that for the want of laborers they too must adopt an eight-hour day (eight hours before noon and eight hours after), that the thousands of leeches gaining a livelihood between the producer and consumer can live on a four-hour day, and be served in bed by electrical appliances manipulated with push buttons. On this account right now the farmers are showing a tendency to decrease production to an amount which can be taken care of by themselves, and furnish a living for their families, and don't propose to worry much about how the 4-hour man is to be fed.

During the past few years the farmer has taken off his coat and fed the world, he is still the producer, but his production will be governed by the aid he has, if he is to do better he must have assistance and one way will be to give him as low a rate as is possible on a commodity that he must have to help in increasing soil fertility, agricultural limestone, and if the prices are low, the freight rates must of necessity be low also.

Illinois Stone Men Protest Use of Gondolas for Automobiles

Interstate Commerce Commission Returns Noncommittal Answer

THE FOLLOWING TELEGRAM was sent to the Car Service Section of the Interstate Commerce Commission at Washington, D. C., on May 19, by A. J. Sullivan, vice-president of the United States Crushed Stone Co., Chicago, on behalf of the Illinois Crushed Stone Association:

"In consideration of the railroads' request that priority rule be again enforced this association respectfully requests embargo be placed upon loading of open-top cars with all commodities excepting crushed stone, coal and road-building materials. We are advised by one of our members that 50 gondola cars ordered into stone quarries for loading limestone for agricultural, building and highway purposes were diverted and sent empty to Detroit for shipment of automobiles. Had these cars been loaded with crushed stone to points intermediate to Detroit the earnings per car would have amounted to a minimum of $30 and a maximum of $100. This outrageous practice has been the means of tying up the construction of highways, buildings, and is retarding the planting of crops by reason of the failure of shippers of limestone to procure the necessary equipment. Railroads in the vicinity of Chicago have hundreds of open-top cars loaded with automobiles awaiting delivery. We respectfully request relief from these obnoxious and costly practices by allowing the movement of crushed and pulverized limestone during the producing season, by order from you."

This telegram was signed:
ILLINOIS CRUSHED STONE ASSOCIATION.

To the foregoing eloquent appeal the following telegram was received, dated two days later, May 22:

"Your wire of May 19th, not likely that priorities for any one commodity or shipper as against others will be authorized at present time."

(Signed) W. C. Kendall,
Car Service Section, Interstate Commerce Commission.

All that the telegram of the Illinois Crushed Stone Association states is only too true. The editor of ROCK PRODUCTS has himself seen within the last week or two scores of open-top cars at an automobile plant near Chicago, being loaded with automobiles, when stone, sand and gravel plants in the immediate vicinity were closed for want of shipping facilities, involving tying up both building and highway construction work.

Since the Illinois Association telegram was sent, however, orders have been issued by the Interstate Commerce Commission that cars shall be loaded with the materials for which they were designed. Undoubtedly the action of the Illinois Association was a helping factor in getting out this order, although of course refrigerator cars are being misused for the same purpose against the protests of food producers and packers.

Indiana Farmers Turn to Home Pulverizers

EVANSVILLE, IND.—The matter of getting agricultural limestone for next fall formed the chief topic of discussion at a recent meeting of the Perry Township Farmers' Federation. The men decided to make an effort to have limestone crushed in the township for use on their lands, if this was at all possible. German and Perry townships, Vanderburg county, are working together on the proposition; and have a good assurance that they will be able to secure a crusher for this purpose. Several of the farmers already have ordered carload lots, but this is unsatisfactory as the farmers may not be able to unload the car at the time of its arrival. Another feature of the local crushing is that more farmers will be able to use limestone and each one will use more than would be the case if the limestone had to be shipped in under present railway conditions.

Lime Association Has St. Louis Office

MEMBERS of the National Lime Association in the St. Louis, Mo., district have formed a group organization for promotional work after the plan of the Eastern Bureau of the National Lime Association.

After much discussion it was decided to confine activities to a relatively small district surrounding St. Louis, rather than to include as first proposed the territory of the Southwest generally.

West Virginia Soils Need Lime

A SURVEY OF THE NEEDS of lime in West Virginia by means of samples of soil tested in the laboratory indicate that 83 per cent of all soils tested are in need of liming.

Discussion of Proposed Uniform Agricultural Lime Law

Critical Analysis from the Farmer Point of View

By John H. Voorhees
Associate Editor, "Pennsylvania Farmer," Philadelphia, Penn.

THE NATIONAL LIME ASSOCIATION has prepared a preliminary law for the regulation of the sale of lime and liming materials which it proposes to submit, first to the manufacturers of lime or producers of liming materials, including both limestone and burnt forms of lime, and then to officials of the agricultural colleges, experiment stations and regulatory officers of the various states.

This proposed law, formulated by E. O. Fippin of the National Lime Association, has many admirable qualities to recommend it to legislators. It is a step in the right direction and one badly needed by many states, and it is of vital interest to the entire agricultural lime industry because it will, if adopted, definitely decide the nomenclature of all liming materials for agricultural purposes.

It must be recognized in studying this law that a number of states have laws, some of which are working out satisfactorily. They are showing the way for more progressive statutes and the proposals under discussion show that these have been consulted for their outstanding features.

There appears to be no reason why these states should not fall in line with others in adopting a new statute to simplify the details of organizations trading in two or more states. It stands to reason, however, that any law to be substituted for those already in force, must be an improvement and provide greater protection for the consumer of the material offered for sale, and still be possible of practical operation by laboratory methods. Why should Pennsylvania, for instance, repeal its present law and adopt a new one proposed by outside parties? The answer must be for improvement, and because such laws are for the protection mainly of the consumer, it must provide the fullest protection for the farmer who buys the lime.

It is my opinion that the proposed law is an improvement for reasons which I will explain later, but it occurs to me that possibly it would have been better policy considering the eccentricity of individuals of this day and time to have called together the regulatory officers of the various states having laws, the manufacturers of those states, and a number of representative farmers from each state, to draft such a proposed law.

The seed analists of the United States joined in an organization to have a uniform seed law committee which is functioning successfully. In this morning's paper (May 22, 1920) I note that a conference of investigators, experiment station men, farmers and canners are meeting in Harrisburg, Pa., to formulate an equitable plan whereby the canners and tomato growers may determine prices. Such a procedure would pave the way for adoption with less opposition. The force of opposition arguments would be spent by the time the bill is proposed for a hearing.

The proposed law like those in force in the various states would appear to be discriminatory in no offensive way. So far as may be obtained by a careful reading of the document it places the responsibility of selection upon the farmer. It operates by advertising the products on the market, which is unquestionably the most equitable means of developing a fair and just means of distribution. Such a method stimulates the purchaser to study the market and learn of the material best adapted to his use from many points of view, including the cost of the material based on its ability to accomplish its object. This feature I consider of vital importance.

Two outstanding qualities of the law are its simplicity and lack of unnecessary clauses, phrases and words. The definitions of the materials are good, clear and should be easily understood by farmers. It would seem unnecessary to include a definition for "a mixture of lime materials." In a sense this is a loophole for poorly manufactured materials, those incompletely burned, especially. It is true that some manufacturers are selling a mixture of liming materials, but this fact should be detected in the chemical analysis and guarantee.

A very marked advance over present-day statutes is the inclusion of the sieve test based on the standard specifications of the U. S. Bureau of Standards. These are worked out on the metric system and doubtless will mean little to farmers without explanation. The openings are round rather than square and the error is minimized. In fact the tolerance of such sieves is in no case greater than 5 per cent, whereas it is as high as 15 per cent in maximum opening.

Should Provide for Finer Sieve Analysis

This involves a discussion of the sieves to be used and the materials which should be tested for fineness of division. According to the provisions of the proposed law, sieves 10, 18, 35 and 60, which are very nearly equivalent to the same numbers in meshes to each inch, are to be required. For a large part of the country this series of sieves would give sufficient information, but it is questionable whether the manufacturer of ground or pulverized limestone should not be accorded the privilege of including finer sieves if he has installed machinery especially to place a finer material on the market.

One company, within my knowledge, operating in a state where very finely divided material is highly thought of, has a product 85 per cent passing a 200-mesh sieve and 95 per cent passing 100-mesh sieve. This is expressed diametrically opposite to the wording of the proposed law, but that is a matter of no great moment. Should not such a manufacturer be accorded the privilege of including sieves Nos. 100 and 200 of approximately the same mesh and placing the results of these additional tests on the label of bag, package, or bulk shipment? To limit the sieve tests to four sieves and not permit the use of finer-mesh ones or give credit for finer-mesh ones, is a discouragement to the manufacturer of finely pulverized material and in a sense discriminates against them.

Quick lime (lump form), quick lime (pulverized form) and hydrated lime are exempted from the sieve test. It is obvious that quick lime in the lump form should be omitted. Pulverized quick lime and hydrated lime might well be included. To omit hydrated lime on the basis that it is always more finely divided than the requirements for other forms of lime is an unwarranted assumption. It is probably all right for hydrated lime which is subjected to air separation, but much hydrated lime on the market is slaked, nothing else, by means of the common ordinary variety of garden hose and sometimes on nothing more than a dirt floor. Such material is very likely to contain unburned and unslaked particles. Several years ago I purchased a carload of hydrated lime in sacks which contained so many particles of unburned lime (like pebbles) that it would not drill and I was compelled to have it spread by hand from the rear of a wagon. It is unfortunate that this condition exists

but it does to a limited extent and must be considered.

Reporting Chemical Analyses

Probably the biggest bone of contention from the manufacturers' point of view and one which needs careful consideration from the farmers' point of view is the matter of reporting the chemical analysis of any material on the basis of the oxides of calcium and magnesium contained. From the standpoint of advertising and publicity this is clearly in favor of the manufacturer of burned and hydrated lime, and at the same time a clear means of statement to the farmer. Regarding it Professor Fippin remarks:

The chemical analysis of all liming materials should be in a form that is directly comparable for all materials. In line with the practice in reporting the analysis of fertilizer materials, it is believed that liming materials should be reported upon the basis of their content of the oxides of the lime elements, namely, calcium and magnesium, or in terms of the actual lime elements. To report the material on any other basis is confusing to the farmer and serves no good purpose and is like the older practice of reporting the content of phosphorous in fertilizer in terms of bone phosphate *irrespective of the real form in which it occurs.** By reporting separately the content of both calcium oxide and magnesium oxide, as well as the total content of oxides, any person examining such analysis is able to evaluate these materials in such manner as his judgment dictates. The provision for the report on the proportion of the total oxides in the form of carbonate should also satisfy those persons who are concerned to know the actual form of chemical combination of the constituents.

There are a number of other ways in which the report may be made, though each may be somewhat confusing and possibly no better theoretically. First, the report may be made in the form in which the lime is sold. For instance, limestone may be reported in terms of carbonates, burned lime in oxides, and hydrated lime in terms of oxides. Second, the reports may be made in the form in which the material is sold and the equivalents given in all cases, and third, the reports may be made in terms of oxides, and the equivalents given in each case, provided the form in which the material is offered for sale is indicated in some manner on the tag, possibly by the trade mark. It is my opinion that it would be more just to all concerned to report the analysis in the form in which the material occurs and give the equivalents immediately afterward in each case. For instance, 98 per cent calcium carbonate equivalent to 54.88 per cent calcium oxide for a 98 per cent pure pulverized limestone and the reverse for burned lime. It is further my opinion that acid insoluble matter should be reported, and in cases where the material is contaminated by a manufacturing process, borax or other injurious substances it should be reported.

Labels, tags and stamps are provided for, but no definite wording can be fixed until the chemical and physical tests are decided. They are vitally important and should not be overlooked in any of their details.

*Italics are author's (Voorhees).

Exceptions of Proposed Law

The clauses defining exceptions also need careful study. They should be framed in a manner that will not discourage the development of our natural resources. Two provisions defining the exceptions are as follows:

a. None of the provisions of this act shall apply to the product of portable crushers, which are clearly designed to be moved from place to place.

b. When any of the liming material coming under the provisions of this law is delivered in bulk at the point where produced into the wagon or other vehicle of the user of such material, the brand license fee provided in this law shall be waived, but all other provisions of this law shall apply in full force.

Professor Fippin comments on these articles:

It seems necessary to recognize the impracticability of applying the provisions of a law of this character to absolutely all material that may be used by farmers, partly because of the small size of some producing operations and partly because of the conditions under which the material is acquired by the farmer. In the case of portable crushers, the responsibility of the farmer is likely to be quite as large as that of the operator of the crusher for the character of the material. Where the material is hauled from the mill or kiln by the user of the material who lives in the neighborhood of the plant, he is presumed to be acquainted with the character of the material and to accept his responsibilities accordingly. This is a principle that has been particularly recognized in the State of Pennsylvania. However, he is entitled to have some definite information about the chemical character of the material produced.

Farmers should be left free to develop local sources of lime, without state interference, either by individual or collective effort, and should be free to distribute the material without tag or license within certain limits. There appears to be no reason why a stationary crusher, or a home-made kiln, as well as a portable crusher, should not be operated with freedom so long as the material is for local use and not entrusted to a recognized common carrier for distribution. In case limitations are desirable they might better be based on the size of the business and each individual or collection of individuals accorded an exemption of, say, 300 or 500 tons or whatever might be reasonably consumed within the local territory.

It must be recognized that our facilities for distribution, while superior to those of any other country, are still inadequate for the purpose of supplying cheap service to all, and some farmers located in remote places where freight charges are prohibitive should be accorded the privilege of self-endeavor without interference, especially when many of them have the raw materials in their own possession.

And at the same time it must be remembered that every small crusher, stationary or permanent, and every small pot-kiln, is a potential asset for the manufacturer. For a time it alleviates him for his shortcomings and his inability to deliver goods at a reasonable price to the remote farmer, but at the same time it educates the farmers of an entire community of the value of lime, and in the end, as facilities for distribution develop and improve, these farmers come into the fold of purchasers of commercial products because lime grinding and burning is not within the sphere of their own businesses and interferes with the operation of their farms.

Finally, it is my opinion that there should be no penalty for deficiency in guaranteed analysis. This would defeat the advertising and educational features of the law which are especially important. The chemist's certificate of analysis, however should be available for court procedure and held as reliable evidence of fraud in case the consumer should desire to use it, which is not likely unless the difference were large. Cases of this character are very infrequent and the farmer purchaser ordinarily would simply purchase from another source, which is shown by the annual report required by the law to be up to the guarantee.

National Lime Association Reports on Corrosion Tests

WITH A VIEW TO DETERMINING whether or not the presence of lime in mortars and other building materials prevents the corrosion of metal used as reinforcement, the chemical laboratory of the National Lime Association has recently made up slabs of various materials used in building operations both without lime and with varying quantities of lime in which polished steel rods are imbedded. In one series the slabs are cured for different periods in air only, while in duplicate series they are immersed at regular intervals in water for five-minute periods.

The thirty-day breaks have been made on corrosion test slabs of the following materials:

Lime Plaster (high calcium and high magnesium)
1-2-4 Concrete without lime
1-2-4 Concrete with 5 per cent lime
1-2-4 Concrete with 10 per cent lime
1-2-4 Concrete with 15 per cent lime
Gypsum without lime
Gypsum with 5 per cent lime.

The air-cured gypsum slab showed practically the same amount of corrosion of the steel rods as in the case of the two-week break, while the slab which had been dipped in water showed a considerable increase in the amount of corrosion. In the case of gypsum containing lime no corrosion was visible in *either the air or water-cured sample.*

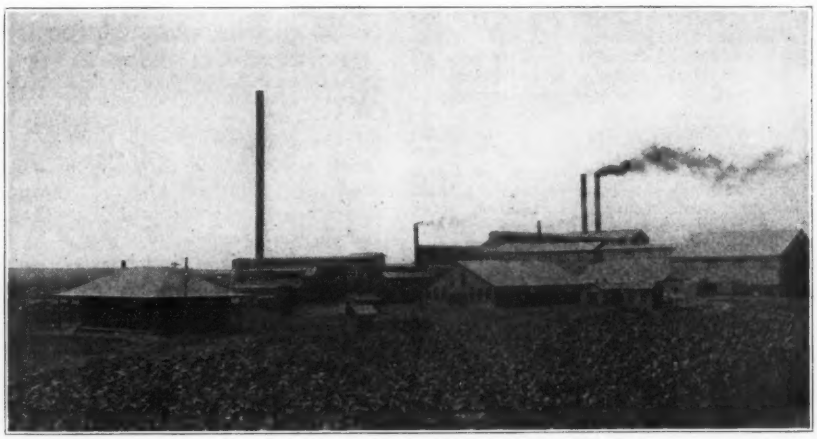
None of the other slabs showed any corrosion of the steel.

Great Western Portland Cement Company Expands

Makes Improvements in Quarry Operation and Thoroughly Modernizes Plant

WITH A TOTAL expenditure of $600,000 during the past winter and present spring, the Great Western Portland Cement Co. of Mildred, Kans., is expecting to increase the output of its mill and make it one of the most modern wet process plants in that part of the country. The enlargement and improvements are being made in all departments.

Steam shovel quarry operations will replace the former hand method of loading stone; a 60x48-inch jaw crusher has been installed for the main breaker; some wet process kominuters are being added, and with the addition of the three recently completed reinforced concrete slurry tanks, the storage of slurry will be sufficient for several days' run. Two of the storage tanks have a 2,000-barrel capacity and the third has a 1,000-barrel capacity.



The plant of the Great Western Portland Cement Company at Mildred, Kansas

Kilns Lengthened

By changing the lengths of the kilns from 125 to 160 feet the clinker burning capacity will be increased and also the longer kilns will give better economy than shorter ones for a wet process. A set of electrically-driven slurry pumps are being installed to aid in pumping the slurry into the new storage tanks. The capacity of the finishing end, including the packing house and loading facilities, will also be increased.

Quarry and Crushing Plant

The raw materials used in this process are limestone and clay, which are obtained from the same quarry. The face of the quarry shows a very heavy layer of limestone and a well-proportioned strip of clay overburdens, which material, as stated before, is used in the manufacture of cement. The clay is first removed and sent to a disintegrating mill, known as a wash mill, where it is prepared for mix with the limestone. The rock is quarried and handled by a steam shovel and loaded into standard-gauge equipment and sent directly to the larger jaw crusher. Under this arrangement the company has dispensed with the very common practice in this district of elevating the material by means of expensive hoists and trestles. From the jaw crusher the material is elevated to a rock storage bin of fifteen days' capacity.

Construction view of the new incline being built and developments in the quarry

Proportioning Mix

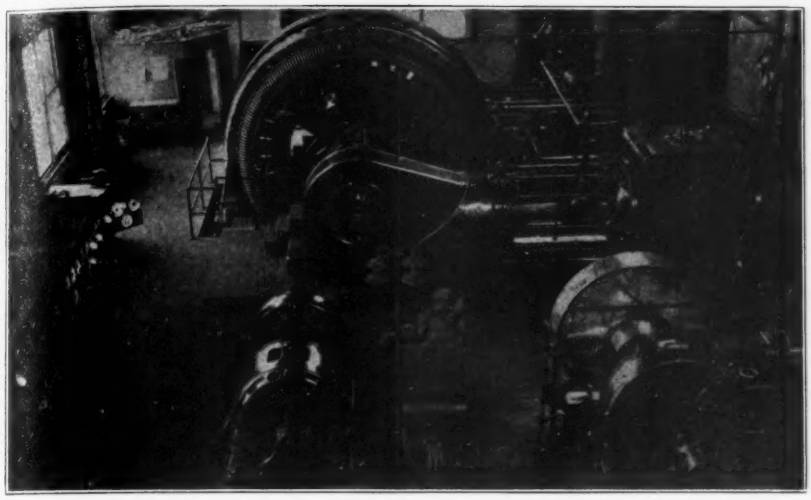
The mix is handled by automatic devices. The rock from the storage bin is conveyed by belt conveyors to an elevator, where it is discharged into a storage tank above the kominuter. The clay is pumped by electrically-driven pumps to the tube mills, where the limestone and shale is mixed. The slurry is first conveyed to small correcting tanks, where it is tested. To insure that the slurry burned will be uniform the slurry from the small tanks is then pumped into a large mixing tank. From the mixing tank it is then conveyed by means of pumps into the storage tanks. Mechanical agitators throughout mix the slurry and keep it a uniform product.

The feed to the kilns is the F. L. Smith & Co. improved automatic feed device. The kilns are at present 8x125 feet, but will be increased in length to 160 feet. Coal is used for burning.

Wasted Heat Utilization

During the present reconstruction the kiln hoods are being so changed that any air drawn into the kiln by natural draft will have to come up over the hot clinker as it falls from the kiln into the pit below. This will be accomplished by lengthening the sides of the hood so that the end of the kiln will be covered and it will be easier for air to come in at the bottom than around the sides and top.

Water is added to the clinker as it enters a rotary cooler. The cooler is mounted below and to one side of the kilns so that it is not necessary to elevate the hot clinker. Ordinarily the clinker goes direct to the



Interior of the engine room

finishing end of the mill but may be sent to a clinker reserve. The kominuters and one large tube mill are used in the finishing plant and the finished product is sent to the packing house storage, where it is possible to hold 60,000 barrels of cement.

Coal Handling—Power Plant

Coal is handled from the storage or from the coal cars to the coal room. A battery of Fuller mills is used to reduce the coal used in the cement kilns. The power plant consists of six 410 h.p. water tube boilers and electric current is generated by two dynamos which are driven by side crank reciprocating engines. A direct current motor generator and a small steam engine driven generator are used for starting up, exciting the fields and furnishing lights.

The officers of the Great Western Portland Cement Co. of Kansas are L. L. Seibel, president; J. W. Metz, vice president; O. F. Swanson, general manager, and L. A. Goll, chemist.

Additions being made to the plant

March Cement Exports

WASHINGTON, D. C.—Our foreign business in cement, both import and export, has taken a big jump within the past few weeks, according to figures secured by the Washington Bureau of ROCK PRODUCTS from the Department of Commerce.

Figures for the month of March show our imports to have been 237,579,000 lbs., valued at $13,795, a tremendous increase over preceding months, while our exports amounted to 369,640 barrels, valued at $1,118,948, as compared with 336,316 barrels, valued at $1,046,258, during the month of February.

Growing Demand for Cement in India

AS THE DEMAND for cement in India has considerably increased with the projection of numerous irrigation and harbor construction plans and the extensive building operations and as at the same time importations from Europe have been restricted, owing both to the increasing local demands and the prevailing high freight rates, several concerns are investigating the possibilities of increasing the output in India, as the prospects for cement manufacturing there are said to be distinctly good.—Commercial Report of U. S. Consular Service.

Cement Industry of Sweden

THE MANUFACTURE OF CEMENT in the form called portland cement is not of early date in Sweden, the first cement factory being erected in 1871 at Lomma in Skane. Clay of suitable quality occurs there in large quantities and the lime material was taken from the adjacent Limhamn and transported by sea to Lomma.

This was the origin of the Skanska Cementaktiebolaget, whose first director, R. F. Berg, has greatly contributed to the development of the cement industry in Sweden.

There are natural facilities for the manufacture of cement in Sweden in view of the rich supply of suitable raw material, and a number of factories have been erected. The sale of the product of all these factories is undertaken by the Svenska Cementforsaljnings A/B at Malmo.

The Swedish cement, in virtue of its excellent quality, has acquired a good reputation also in foreign countries, to begin with under the name of Lomma cement. All the seven Swedish factories, when working at full strength, can produce about two and a half million barrels of cement per annum. In 1913 the output was 390,000 tons (2,295,000 barrels), with a value of 10,830,000 kronor.

Out of the exports in the same year (altogether 137,000 tons) 42,000 tons went to Russia, 37,000 tons to the Argentine, 31,660 tons to the Sunda Islands, 5,000 tons to Denmark, etc.

A large number of cement works have sprung up in the country, with an output value for 1913 of 4,000,000 kronor. The oldest and largest of them is the A/B Skanska Cementgjuteriet at Malmo, with branches in several places in Sweden.

The Chinese Cement Industry

A CHINESE CEMENT COMPANY located at Tong-shan, Chihli province on the Peking-Mukden Railway controls the cement industry of north China. The factory was established in 1906 and is equipped with modern machinery. Limestone exists on the site of the works.

The product is gray portland (no white) and both wet and dry processes are used, with large rotary kilns. The normal output is 600,000 barrels per annum, but in 1918 the output was 800,000 barrels.

Foreign markets have principally been Java and the Philippine Islands, and locally the product is mostly used by the railways and mines. The cement is cheaper than the imported product, there being no likin or transit dues leviable.

Foreign cement imported into Tientsin in 1918 amounted to 3,030 barrels, while Chinese cement exported in 1918, largely to Chinese ports, amounted to 198,726 barrels.—Commercial Report.

Safe Storage of Coal at Lime and Cement Plants

Answers to Commonly Asked Questions in Regard to Storage of Bituminous Coal

By H. H. Stoek
Consulting Engineer, U. S. Bureau of Mines

EVERY COAL CONSUMER should store what he can. The consumer should place his order early in the spring and store his supply as early as he can get it. Power plants should maintain a reserve supply, adding to and subtracting from the storage so as to make uniform deliveries possible through the period of the year most favorable to transportation. A reserve supply, sufficient for 30 to 90 days continuous operation is desirable.

Why store coal?

To guard against interruptions of supply.

To take advantage of lower prices in the spring and summer.

To give steady employment to miners instead of seasonal employment.

To transport coal in good weather, when it costs less.

What would be the result of more storage?

It would permit coal mines to operate continuously instead of intermittently. Intermittent operation increases the cost per ton for mining, and makes the yearly return to labor low. These conditions contribute to serious instability and unrest in one of the fundamental industries of the country and this can be changed only by coal buyers doing their part to insure steady work.

The railroads are now required to transport the maximum amount of coal during the winter months when traffic is most interfered with by bad weather and when the maximum amount of coal is used by the railroads to handle other coal. The railroads now use nearly 30 per cent of the total output of coal. About one-third of their freight traffic is hauling coal, so that economy of fuel used by the railroads will produce a considerable gross saving.

Railroads are required to transport large amounts of coal in the autumn months when they are operating under pressure to move the crops. If some of this load can be transferred to the spring and early summer months when crop transportation is at a minimum, further economies will be effected.

What are the objections to storing coal?

Money is tied up for some months unless deferred payments can be arranged.

If coal must be rehandled this increases the cost.

If the coal is friable every rehandling produces fine coal or slack which, in excess, is sometimes more difficult to burn efficiently.

Storage facilities cost money to provide, maintain, and operate.

If fine coal is stored there is some risk of spontaneous combustion of coals other than anthracite.

Does coal deteriorate in heating power when stored?

There is no appreciable loss of heating power because of age.

Is there chance of loss in the storage of coal?

Sometimes coal heats spontaneously. If allowed to heat too much it loses in heating value and must be removed and cooled. This makes an expensive rehandling. Considering the number of storage operations this chance is extremely remote.

What kinds of bituminous coal can be stored?

Any kind, providing proper precautions are taken. Some kinds of bituminous coal are more liable to spontaneous combustion than others, but it is not possible to say of any given kind of coal that it will or will not ignite under favorable conditions.

What about lignite?

Lignite and subbituminous coal have a stronger tendency toward spontaneous combustion than most bituminous coals, but with care they can be stored. Since they lose moisture rapidly the degradation in size is an objection to storage.

What is the cause of spontaneous combustion?

It is apparently due to an oxidation of the coal surface. This generates heat. If the heat is not dissipated, the temperature will continue to rise. The oxidation is more rapid at increased temperatures so that the process is self-aggravating. A temperature may finally be reached where the coal is afire.

How may heating be detected?

By the odor given off from the pile or by thrusting iron rods into the pile and feeling them with the hand or by a thermometer. Steam should not be confused with smoke, for water vapor coming out of the pile in winter time may produce visible steam when there is no appreciable heating within the pile. Temperature tests with an iron rod should be made if possible; actual temperature determinations should be made with any suitable type of thermometer.

What temperature is dangerous?

When the temperature rises above 140 degrees Fahrenheit, the pile should be carefully watched. If it rises rapidly to 150 or 160 degrees steps should be taken to move the coal and cool off the heated part.

What is the best way to stop heating which has started?

The best way is to move the coal as quickly as possible to a place where it can cool off. It should be allowed to become thoroughly cooled before replacing it in storage, or, better still, used at once and not returned to storage.

Can heating be stopped by putting water upon the pile?

Only if it is applied in sufficient quantities to extinguish the fire and cool the mass. The water must reach the point at which heating occurs, for it can do but little good if the stream is only played upon the surface of the pile. Most bituminous coal cokes on heating, and a shell of tarry material is formed about the hot spot which prevents the water reaching it. To be sure that the water reaches the burning coal, it is usually necessary to dig into the pile and turn it over. It is usually better to move the coal and not depend on water.

Does time have any effect on the heating of coal?

Three-fourths of the coal fires studied have occurred within 90 days after the coal was placed in storage. Oxidation is most rapid on a freshly broken surface.

What effect has sulphur on the heating of coal?

Oxidation of the pyrite in the coal also produces heat and assists in breaking up the lumps and thus increases the amount of fine coal in the pile. Rise in temperature, either from external or internal causes promotes the oxidation of pyrite and thus increases the liability of the coal to spontaneous combustion. It is wise to select low sulphur coals for storage if procurable, but it must not be taken for granted that a low sulphur coal will necessarily store well, or that a high sulphur coal will fire in storage.

Is it bad practice to mix different kinds of coal in storage?

This is generally believed to be the case, but there seems to be no logical basis for the belief except in so far as mixing may produce conditions within the pile that lead to heating.

What precautions prevent spontaneous combustion?

Avoid storing fine coal. Store screened nut and lump. Avoid external sources of heat, such as steam pipes, warm flues, and boiler settings. Avoid making fresh broken surfaces in handling the coal into storage.

Avoid foreign combustible matter which may itself spontaneously heat, such as rags, paper, waste, etc.

Avoid sticks and timbers in the pile which, surrounded by coarser coal, form ducts or flues concentrating the warm currents from the coal below.

Storage of 20 to 200 Tons

What are general principles to be observed in storing bituminous coal in small amounts, 20 to 200 tons?

The prevention of degradation, of segregation, of exposure to oxidation under conditions favorable for the generation of heat, and of exposure to outside sources of heat.

What is meant by degradation?

The reduction in size of the coal. This increases coal surface. It has already been explained that oxidation of the surface of the coal is the cause of its heating. The finer the coal the greater is its surface in proportion to its volume, and the greater likelihood of its heating.

How may breakage of coal during storage be avoided?

By taking care not to drop it from a height. If there is a choice of coal for storage the least friable should be chosen.

What is meant by segregation?

The separation of the fine coal from the coarser pieces. If the coal is allowed to roll or slide, this segregation takes place, and furnishes favorable conditions for heating at some place.

How may segregation be avoided?

By being careful not to dump coal at a single point in a pile, where fine coal would collect. The coal should be spread in uniform horizontal layers.

Is there much fire risk to a building in which coal is stored in amounts up to 200 tons?

No; whenever heating occurs it proresses slowly and can usually be detected by the odor from the pile long before there is any danger.

What precautions should be taken?

The coal pile should be inspected daily to note whether there are any signs of heating, such as odor, visible vapor, warmth to the hand, or of rods thrust into the pile.

Storage of 200 to 1000 Tons

Does this call for additional precautions?

Yes; for the larger the pile, the more difficult it is to watch and the more important it is to prevent heating.

Is there much difficulty in storing screened coal in piles of 200 to 1,000 tons?

Not if precautions are taken to prevent breakage and subsequent segregation.

Why is it easier to store lump coal?

Because the heating surface is relatively small and the open spaces between the lumps permit the air to pass through the pile and carry off any heat generated.

Do fires occur in lump coal storage piles?

Very seldom, if at all, and upon investigation it will usually be found that the coal has been broken by being dumped from a height, the fire starting in the fine coal thus produced.

Can slack coal be stored safely?

Slack coal and screenings have been safely stored in large amounts in the air but the only absolutely safe way is under water. If this is impracticable keep air out of the coal pile as much as possible by compacting the pile and approximating the conditions that prevail in under water storage.

Can mine-run coal be stored safely under ordinary conditions?

The presence of fine coal and dust makes its storage difficult. Many varieties may be successfully stored in small, low piles. In storing mine-run coal it should be placed in uniform layers and segregation of the sizes prevented. The piles should be as low as space will permit, carefully watched, and provision made to move the coal if heating occurs.

Is a definite place for storing necessary?

Before it is time to begin the actual storing, a suitable place should be prepared and a definite policy outlined far enough in advance so that everyone who will have to do with the storing may receive definite instructions and not merely suggestions. It is unwise to wait until the coal to be stored has been delivered and then dump it anywhere on the ground merely to release the cars promptly. Storage instructions should be prepared in advance and carried out to the letter. Many failures in storing coal have been due not to faulty instructions, but to the fact that the instructions have not been followed.

What is the advantage of careful inspection during delivery?

To be certain that fine coal or slack has not been mixed with the size of coal that it is desired to store.

Is it better to store coal in the open or under cover?

It seems to make little difference.

Since the heat is due to oxidation, what may be done to prevent circulation of air through the pile?

Storage under water completely excludes air and prevents heating.

Storage in air-tight containers, such as cement bins sealed at the bottom, also prevent heating.

If piles are so built as to be as dense as possible the air flow will be retarded.

Is it desirable to store coal in pits?

Pits will serve to restrict air movement through the pile, but as they are usually filled by backing the wagons or trucks over the pile, the fine coal thus produced is extremely likely to start a fire.

What kind of surface should coal be stored upon?

A concrete floor is best, but a hard clay bottom thoroughly drained is desirable if the former is too expensive. Coal should not be dumped on ground covered with ashes or refuse of any kind, and the ground should always be cleaned of vegetation and leveled off so that the reclaiming of the coal may be done as easily as possible and the dirt or refuse will not become mixed with the coal.

What objection is there to dumping coal from a trestle?

Breakage results; the legs of the trestle also tend to produce channels for air circulation. If the coal is of a size or grade likely to heat it is not safe to dump it about the legs of a trestle.

Does moisture have any effect in connection with spontaneous combustion?

The evidence of chemical laboratory experiments is contradictory. It is not wise to put wet fine coal upon a pile if it can be avoided, or to store coal on a damp base. Water or melting snow, trickling through a coal pile will tend to choke the interstices and change the ventilating conditions, possibly leading to heating.

Storage of Over 100 Tons

What special precautions should be taken in storage in large piles?

The bigger the pile the more likely that somewhere within it conditions favorable to heating may occur, and the more difficult it will be to move the coal in case of trouble. We are therefore warranted in taking unusual care to prevent likelihood of heating.

Is it well to ventilate these large piles?

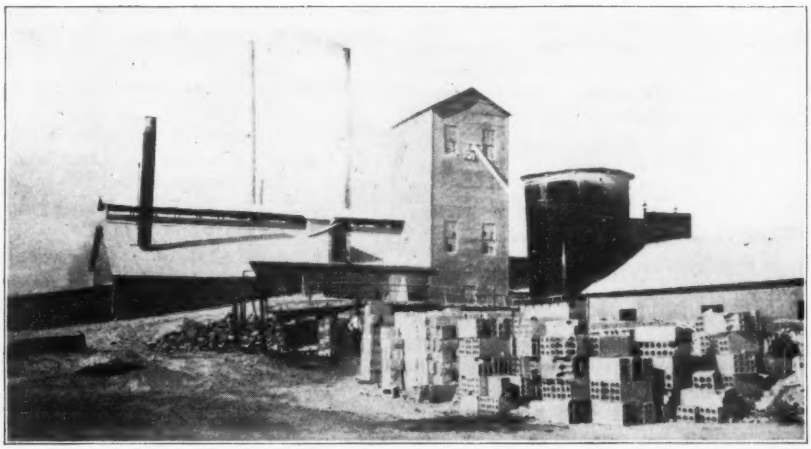
The effect of ventilating coal piles is a disputed point, but the weight of evidence in the United States seems to be against the practice.

Where can additional data on the storage of coal be obtained?

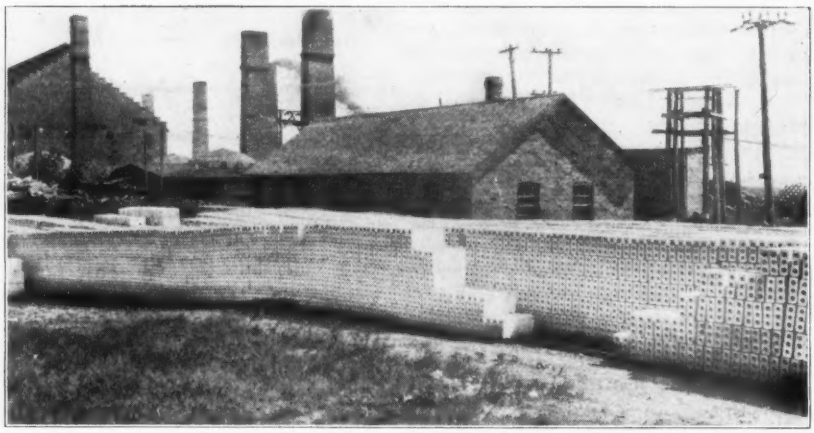
U. S. Bureau of Mines:
Bulletin 136, "The Deterioration of Stored Coal," by H. C. Porter and F. K. Ovitz.
Technical Paper 2, "The Escape of Gas from Coal," by H. C. Porter and F. K. Ovitz.
Technical Paper 16, "Deterioration and Spontaneous Heating of Coal in Storage, a Preliminary Report," by H. C. Porter and F. K. Ovitz.
Technical Paper 170, "The Diffusion of Ogygen Through Stored Coal," by S. H. Katz.
Technical Paper 172, "Effects of Moisture on the Spontaneous Heating of Stored Coal," by S. H. Katz and H. C. Porter.
Superintendent of Documents, Washington, D. C.:
Technical Paper 65, "A Study of the Oxidation of Coal," by H. C. Porter.
(U. S. Bureau of Mines, Reports of Investigations.)

Gypsum-Block Buildings and Houses

New Use of Gypsum as a Structural Material for Exterior Walls



Gypsum blocks, hollow and solid, for exterior walls, at plant of Arizona Gypsum Plaster Co., Douglas, Ariz.



Gypsum block or tile for interior partitions in stock yard at factory

Molded blocks of gypsum plaster almost the only material used in these stores and apartments

By R. W. Stone

GYPSUM BLOCKS OR TILE are now extensively used in modern office buildings and apartment houses. These tile are 24 to 30 in. long, 12 in. wide, 3 or 4 in. thick, and have 3 round holes through them. They are made of gypsum plaster mixed with wood pulp or other filler and are used for interior partitions in steel frame buildings. Partitions built of them are sound-retarding and fire-resistant, and large quantities of gypsum tile are used annually for this purpose. Because they will not bear a heavy burden these tiles are not used where much strain will come on them.

Gypsum can be molded in blocks of various shapes and sizes in much the same manner as concrete blocks are made. The blocks may be solid or hollow, rough or smooth faced, large or small, white or colored.

For Resident Walls

The use of gypsum blocks as the principal material in the construction of houses, however, has as yet received little attention in the United States. Such use is feasible. The principal restriction is probably the weight of the load they will carry. For gypsum block walls without additional framing to support the weight probably should not be more than that of a building one or one-and-a-half stories high. Walls of gypsum blocks are much softer than concrete and somewhat porous, but the surfaces probably indurate slightly on exposure to weather. In many parts of the United States they should stand the climate without waterproofing; elsewhere a waterproof coat should insure their enduring without deterioration for many years.

Hollow gypsum blocks have been used for the exterior walls of buildings in two localities known to the writer. These are the Big Horn Basin, Wyoming; and Douglas, Arizona. There may be others. In both places timber is scarce and gypsum is abundant. In both places also the climate is arid, the average annual rainfall being less than 12 in. In Wyoming, low temperatures are experienced, but at Douglas frost is almost unknown. Climatic conditions, however, need not be considered unless they are particularly damp and cold, in which case frost action might have a harmful effect on unprotected blocks.

The accompanying illustrations are

from photographs in the United States Geological Survey collection, made by the writer. One shows a gypsum plant at Douglas, Arizona, with gypsum blocks of various shapes and sizes stored in the open. Another is of a warehouse built of smooth-faced hollow blocks 24x12x8 in. and 24x12x12 in. This type of construction is commonly employed for garages and other small buildings in Douglas. Another picture is of a residence built of the smooth blocks and surfaced with gypsum stucco or pebble dash. The stucco is coated with waterproof paint.

This gable-roofed house with its wood trim is constructed almost entirely of large gypsum blocks. The roof, built with wide overhang for additional protection to the walls, is of asbestos composition shingles. Hollow gypsum blocks are used at Douglas also as backing for brick veneer. Another type of hollow gypsum block used at Douglas is shown in the picture of a bungalow, with roof and gable of wood shingles. The blocks used here are molded to imitate cut-stone faces and make a very presentable exterior wall. The window caps and sills also are gypsum.

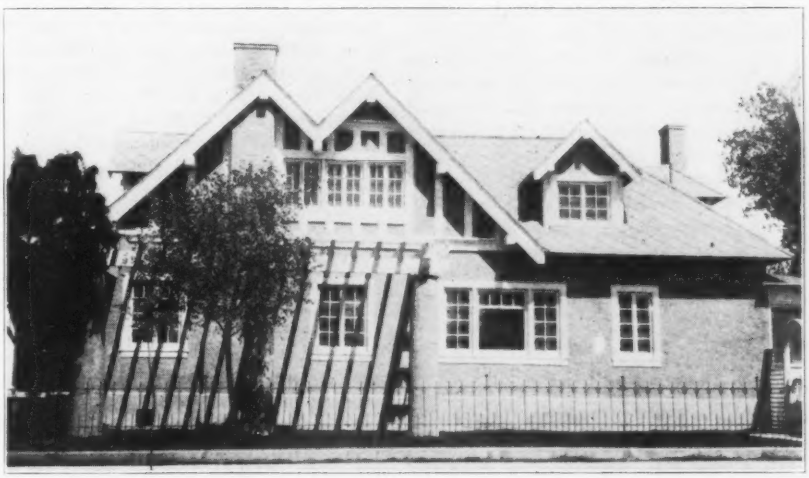
Molded gypsum blocks with cut-stone face, used for stores and one-story block houses, are shown in the last view. The effect here is rather severe, but the picture serves to illustrate a fairly permanent construction that can be erected very quickly. Because of the size and light weight of the blocks, and their true edges, walls built of these blocks go up rapidly and the work can be done by amateur masons. For this reason it is said a gypsum-block building can be put up for 25 per cent less cost than other kinds of masonry.

The writer does not know of gypsum-block houses in other parts of the country, but sees no reason why this material should not be used for bungalows and other low buildings, especially in those localities which are rarely subject to severe frost. In the northern part of the United States, buildings of molded gypsum blocks would stand exposure to the weather for many years, especially if the surface were water-proofed. Gypsum is abundant in many states, and gypsum block and tile are made by the following gypsum companies:

Acme Cement Plaster Co., Frisco Building, St. Louis, Mo.
American Cement Plaster Co., 111 West Washington Street, Chicago, Ill.
Arizona Gypsum Co., Douglas, Ariz.
Basin Cement Plaster Co., Stucco, Wyo.
Douglas Gypsum Block & Plaster Co., Douglas, Ariz.
Durfee, Seth, Kane, Wyo.
Keystone Plaster Co., Chester, Pa.
King, J. B., & Co., 17 State Street, New York, N. Y.
Michigan Gypsum Co., Grand Rapids, Mich.

Warehouse at Douglas, Ariz., built of hollow gypsum blocks

Bungalow built of gypsum blocks molded to imitate cut stone



House at Douglas, Ariz., built of hollow gypsum blocks and surfaced with gypsum stucco

Nephi Plaster & Manufacturing Co., Salt Lake City, Utah.
Plymouth Gypsum Co., Fort Dodge, Iowa.
Reeb, M. A., Corporation, 597 Michigan Avenue, Buffalo, N. Y.
United States Gypsum Co., 205 West Monroe Street, Chicago, Ill.

Practical Chemistry for Lime and Cement Manufacturers

V—The Element Oxygen and Its Chemical Relations to Industry

By Richard K. Meade, M. S.
Consulting Chemical and Industrial Engineer, 11-13 E. Fayette St., Baltimore, Md.

OF THE CHEMICAL ELEMENTS, two are liquids, ten are gases and the rest are solids at ordinary temperatures. They are often arbitrarily divided into two groups, metals and non-metals. The metallic elements are all solids except mercury They have a characteristic lustrous or bright appearance when polished. The non-metals are many of them gases, one (bromine) is a liquid, and those which are solid are rarely lustrous when polished.

The metals are good conductors of heat and electricity, while the non-metals, on the other hand, are less good conductors. The metals unite with oxygen to form compounds which, when dissolved in water, have a more or less basic character, the non-metals, on the contrary, unite with oxygen to form compounds which, dissolved in water, result in liquids of markedly acid character. The metals rarely combine with hydrogen, but when they do, solids are formed. The non-metals usually combine with hydrogen, forming gaseous compounds.

On decomposing a substance containing metals and non-metals by the electric current, the former wander to the negative pole and the latter to the positive pole.

The element hydrogen is peculiar in that it resembles the metals in many of its chemical properties, and yet, being a gas, it has not the characteristic luster of a metal.

Oxygen

First and most important of all, the chemical elements, so far as human beings are concerned, is oxygen. It is the most active of the elements forming compounds with all others except fluorine and argon. It composes nearly one-half of all terrestrial matter, including air, earth and water. Air is about one-fifth, water eight-ninths and the mineral matter one-half oxygen. Oxygen is essential to the life of all animals, including fish, and is the supporter of combustion.

Oxygen has an atomic weight of 16 and a molecule of oxygen has two atoms, hence its molecular weight is 32. Oxygen is a colorless, odorless gas. It is a little heavier than air and 15.9 times as heavy as hydrogen, the lightest known gas. It is slightly soluble in water, and to this property fish owe their existence, as they breathe the oxygen dissolved in water.

Rusting of Metals—Combustion

The most important property of oxygen is its affinity for, or readiness with which it combines with, other elements. This is shown by the ease with which the metals tarnish and rust. This latter change is nothing but the union of the metal with the oxygen of the air. At usual temperatures, oxygen combines quite slowly with many bodies, but when heat is applied combination takes place rapidly. Combustion is an example of this.

When wood or any other inflammable substance is heated sufficiently in the air, the oxygen in the air unites with the elements of the substance (usually carbon and hydrogen, which compose wood, cloth, paper, etc.), and the substance is said to burn. Air may be looked upon as diluted oxygen, as it is a mixture of one part oxygen with four parts of an inert (inactive) gas nitrogen. Many substances which we consider incombustible will burn quite freely if heated in pure oxygen. Among these are such materials as diamonds, iron, copper, etc.

As I have said, the most important property of oxygen is its tendency to combine with other elements or, in other words, its strong chemical affinity for most of the other elements. If a piece of magnesium wire is left in air, particularly if the latter is moist, the surface of the wire becomes after a time covered with a white coating. If this coating is scraped off and the wire further exposed, it becomes coated with another layer and this cleaning and exposure may be continued until the magnesium has all been converted into this white powder. If analyzed, this powder will be found to consist of only magnesium and oxygen, and is, hence, magnesium oxide, commonly called "magnesia." We all know how a light iron wire exposed to the outside air will ultimately be completely converted to rust. Here the action is similar to that of the magnesium wire, only the red brown powder is composed of iron and oxygen, and hence is iron oxide.

Both of these examples are cases of slow oxidation. If the magnesium wire is heated it takes fire and burns with a very brilliant light, and if we hold the burning wire over a clean piece of dark paper we will see that a white powder has fallen from the wire as it burned. This powder is the same as that formed when the wire tarnishes in the air, and on analysis will be found to be magnesium oxide also. We cannot burn iron wire in air, but if we heat a piece of this to redness and while still red hot dip it into sulphur the latter will take fire, and if the wire is now plunged into a jar of oxygen it will burn brilliantly also. The appearance of the burning wire will be similar to the form of fireworks of which young children are so fond called "Sparklets." The walls and bottom of the jar will become covered with a dark reddish brown substance. This is also iron oxide.

The combustion of substances in air is a case of *rapid* oxidation attended with heat and light. Substances which have the power of uniting with oxygen in air are said to be *combustible* and those which do not possess this power are said to be *incombustible*. We ordinarily speak of the gas with which the burning material combines as the supporter of combustion. Thus both air and oxygen will support combustion. Iron will not combine with the oxygen in the air rapidly enough to produce sensible heat or light, and hence we speak of it as incombustible. Magnesia, however, will actually burn in air, and hence we call it combustible. The chemistry of combustion will be dealt with at length, further on in the series, in connection with fuels.

Breathing

I have mentioned the necessity of oxygen to the life of man and the animals. All of us are more or less familiar with the act of breathing. We know that if human beings are unable to get air they will smother and die. The element in the air which is necessary to life is the oxygen. The air which we breathe enters our lungs and these in turn extract the oxygen. The food which we eat undergoes many changes and some of the products formed from this unite with the oxygen absorbed by our lungs. This slow oxidation furnishes the heat and energy necessary to keep us alive. The process is very complex, but nevertheless the oxidation of our food through a roundabout series of chemical reactions is the final result of our eating and our breathing. The reactions involved are by no means so simple, but the net result of oxygen and food in the human system is the same as that of the fuel and air under a boiler—energy furnished by the combination of certain elements, carbon and hydro-

gen, with oxygen. The burning of the fuel is rapid oxidation and breathing is slow oxidation.

Oxides

As has been stated, oxygen combines with almost all elements and the products so formed are called "oxides." The most important compound of oxygen is water, which may be looked upon as an oxide of the gas hydrogen. Oxygen, as I have said, is also the active agent in air but air is not a compound of oxygen, but merely a mixture of oxygen and another gas, nitrogen. Water and air will both be discussed later.

Preparation of Oxygen—Industrial Uses

Oxygen may be most easily prepared in the laboratory by heating red oxide of mercury or chlorate of potash, both of which give up their oxygen easily.

An interesting laboratory experiment consists in placing a small quantity of red oxide of mercury (mercuric oxide) in a small test tube (⅜ in. by 3 in.) and heating. This substance is then decomposed into mercury and oxygen. While heating the tube thrust into the latter a splinter of wood which has a spark (not a flame) at one end. The spark will burst into flame. This is a test for oxygen and proves the presence of the latter. The mercury, the other constituent of the red powder, collects into the form of small globules on the side of the tube, giving the latter the appearance of a mirror.

Oxygen may be made by heating numerous other substances which contain it. Among the substances most commonly used are potassium chlorate, manganese dioxide and barium dioxide. The following chemical equations show the products formed, etc.:

$HgO = Hg + O$

Mercuric oxide produces mercury and oxygen.

$KClO_3 = KCl + 3O$

Potassium chlorate produces potassium chloride and oxygen.

$MnO_2 = MnO + O$

Manganese dioxide produces managanese oxide and oxygen.

$BaO_2 = Ba + O$

Barium dioxide produces barium oxide and oxygen.

The most common method of preparing oxygen for commercial purposes is now that of Linde. In this process, air, which is a mixture of oxygen and nitrogen, is first liquefied by compression and then allowed to boil. The nitrogen, which boils at —195.5° C., first boils off, leaving behind the oxygen which has a lower boiling point. The chief commercial uses of oxygen are in medicine, for artificial respiration and for acetylene welding, cutting, etc. For these purposes it is compressed and sold in steel drums.

(To be continued)

Sixth National Exposition of the Chemical Industries

THE NEXT ANNUAL exposition of the chemical industries will be held at the Grand Central Palace, New York City, September 20 to 25 inclusive. Last year it was held in Chicago. Every year more and more rock products producers are taking an interest in these expositions and meetings. Lime, certainly, is entitled to a place in any chemical exposition and the same is true of finely pulverized limestone, talc, diatomaceous earth, fullers earth, and a variety of other rock products which have long held a place in the manufacturing industries. This field for the rank and file of rock products is little explored, but holds out an attractive if not a large field of consumption for the future.

The Exposition this year, it is announced, will be more pretentious than ever; in fact, it will be the largest distinctly industrial Exposition ever held, and will surpass its own predecessors by one-third.

There are now engaged for the coming Exposition 358 exhibitors which is more than in the last Exposition in Chicago. The growth of this Exposition is remarkable and in a way indicates the growth and development of the chemical industries in America. In 1915 the first Exposition was composed of 83 exhibitors, the second increased to 188, the third to 288, the fourth to 334, and the fifth in which the available space was much restricted and exhibitors were held to a minimum to admit 351 exhibitors, the present number of 358 the managers tell us cannot be much increased in number because of the limited amount of space remaining. Another floor had been added, giving four floors of the Grand Central, each of which covers a whole square city block so that exhibitors could secure increased space and not suffer the cramping felt in the last Exposition.

Growing Interest

Quite as remarkable as the growth of the Exposition itself is the increased attendance and interest that is shown in the exhibits. To the first Exposition there came 63,000 visitors, to the second there came 80,000, and this has steadily increased till at the last there was in excess of 111,000. One who has watched the development of the Exposition and the interest of the visitors can testify to the great improvement in character of representatives the manufacturers have in attendance with their exhibits and the whole-souled way in which they give valuable information and discuss the details of the nature of the many materials on exhibition.

This year the Exposition will have three special sections, one, the Electric Furnace Section, another the Fuel Economy Section, and the third a Materials Handling Section, the two latter are new sections: the first will as its name implies be one of electric furnace exhibits; the Fuel Economy Section will consist of exhibits of machinery and apparatus, furnaces, producers, stokers and all devices for the economic utilization or more efficient combustion of fuel. The possible exhaustion of our fuel reserves in the not far distant future and the present high cost of fuel makes this section one of much interest to all industrial plants. The Materials Handling Section will be a series of exhibits of machinery and equipment for the handling of material such as: conveying, transporting, elevating, included in this will be weighing, measuring and power transmission equipment. So important have these mechanical features become for all industrial plants due to the shortage of high-wage for man-power that an unusual interest is expected in this new Section.

The program for the Exposition will have sessions on subjects, the phases of which will be developed in the exhibits of these latter two sections. There will be sessions on chemical engineering for which an elaborate program is planned. Motion pictures which will have a keen interest for technical men will form part of the program, and there will be popular public addresses as well.

The committee for the Exposition consists of: Charles H. Herty, Chairman Editor "Journal of Industrial & Engineering Chemistry; Raymond F. Bacon, Director, Mellon Institute; L. H. Baekeland, Member, Naval Consulting Board; Henry B. Faber, Consulting Chemist; Ellwood Hendrick, Pres. The Chemist's Club; Bernhard C. Hesse, Chemist, General Chemical Co.; W. S. Landis, Pres. American Electrochemical Society; A. D. Little, Pres. Arthur D. Little, Inc.; Wm. H. Nichols, Chairman Board, General Chemical Co.; W. A. Noyes, Pres. American Chemical Society; H. C. Parmelee, Elitor, "Chemical & Metallurgical Engineering; Fred W. Payne, Co-Manager Exposition; R. P. Perry, Vice-President, The Barrett Co.; Charles F. Roth, Co-Manager Exposition; T. B. Wagner, Vice-President, U. S. Food Products Corp.; David Wesson, Pres., American Institute Chemical Engineers; M. C. Whitaker, Pres., U. S. Industrial Chemical Co., and the managers are Charles F. Roth and Fred W. Payne.

Use of Lime, Limestone in Rubber Other Compounding Ingredients

Non-Technical Explanation of Rubber "Fillers" and Their Functions*

COMMERCIAL RUBBER, known to the layman best as it is used in making tires for automobiles and heels for men's shoes; tubing, hose, packing, belting, sheeting, etc., for industry, is not of course, all pure rubber. It is gathered, as sap much after the fashion of maple syrup, from rubber trees in the tropics. The rubber is coagulated out of this sap, by heat or chemicals and shipped to the rubber factories. Then it is cleaned and alloyed, as it might be termed, with some chemical compound or compounds.

These compounds are usually called compounding ingredients and they perform in general four functions. The first of these is the vulcanization or fixing of the rubber. The second is to aid in or accelerate vulcanization. Without vulcanization, rubber would always be plastic and sticky. It would not retain its shape and it would harden with age and cold. The third function is to give to the rubber the physical properties required in the service, to which the article is to be subjected. Pure rubber even if vulcanization is too soft, does not resist abrasion, is not strong enough in tension nor stiff enough for some purposes, for shoe heels for instance, and would not last long enough under certain conditions. In other words pure rubber does not have the physical properties required and they can be obtained by compounding only. The fourth function of the compounding ingredients is to give any required color.

Purpose of Compounding Ingredients

The value of a compounding ingredient depends entirely upon the degree in which it fulfills any or all of these functions. It is a mistaken idea, held so often, that fillers are put into rubber to cheapen it. That may have been true at one time but now, with the rubber growing plantations highly organized and the cost of rubber reduced by the application of modern ideas and when the ideals of the industry have been so changed as to produce the best rather than the cheapest, it is far from true, in the majority of cases. Often in fact, the fillers cost more per pound than does pure rubber.

Compounding ingredients are divided into four classes, depending upon which of the four functions they perform. As far as commercial rubber manufacture goes the first class is limited to one substance, sulphur. It is the generally accepted agent of vulcanization and until its effect in setting and making permanent the elastic qualities of rubber were discovered by Charles Goodyear, the use of rubber was very limited and of doubtful value. Those of the second class are called accelerators, because they aid in and hasten the process of vulcanization. They are in general, the oxides or hydroxides or basic salts of the metals. There are also a lot of organic substances used for this purpose, but we are not concerned with these. The third class are pure fullers; that is they have little or no effect on the curing of the rubber. It is their physical properties in a mechanical mixture, like the sand in cement, that they give to the rubber compound. The third class are the pigments.

Essential Characteristics

There are several characteristics, which are absolutely essential in any compounding ingredient, no matter whether an accelerator, a plain filler or a pigment. Foremost in importance to the rubber manufacture is *fineness of division*. With the exactness of present day manufacture, no mechanically ground chemical is of very much value in this use. It must be the product of gas reaction or precipitation methods of manufacture to find favor in a rubber man's eyes. In other words it must be finer than any mechanically ground substance can be. Uniformity of color, texture and among the accelerators particularly, purity is of extreme importance.

Some of the more common compounding ingredients may be mentioned separately, commencing with the plain fillers because they are used in the largest quantities.

Fillers

GAS BLACK—Gas black is one of the best fillers and is practically the standard for black rubber. It is made by burning natural gas with insufficient supply of air. It gives to the rubber compound strong, abrasive resisting qualities, high tensile strength and better snap or resiliency than any other compound.

ZINC OXIDE—Zinc oxide, which is made by burning the fumes of metallic zinc in air, gives very much the same properties to a white or light colored compound, and is easily the second choice among inert fillers.

BARYTES—Barytes is used to some extent in heavy cheaper rubbers. It does not add to the strength as do gas black and zinc oxide, but it adds to the weight. Barium sulphate from the precipitation process of manufacture is very much better than the natural rock ground, but at best it is not to be compared with zinc oxide or gas black.

There is a long list of other fillers which are used to more or less extent, in the industry. Among these some of the more common are: Calcium carbonate (limestone), calcium sulphate (gypsum), lithophone, magnesium carbonate, china clay, talc, and others.

INORGANIC ACCELERATORS—Among the accelerators, substances which affect the time of cure of rubber, a few examples are typical. These substances are used in such very small quantities, sometimes not more than one percent, that extreme uniformity and purity become factors of tremendous importance.

LITHARGE—Litharge or lead oxide is one of the most powerful of the accelerators and the use of from 5% to 10% will sometimes reduce the time of cure to one-fifth its time without the accelerator. Litharge makes black rubber compounds due to the formation of lead sulfide and so cannot be used in light colored rubbers. Small traces of litharge in other white rubber fillers often cause their rejection.

LIME—Lime as used in the rubber industry means calcium hydrate. It has a strong accelerating action during vulcanization, but the amount used is small as in the case of other accelerators. It is used in light colored and largely with reclaimed rubber.

MAGNESIUM OXIDE—The best form of magnesium oxide is made by calcining chemically precipitated magnesium carbonate, from which all impurities have already been eliminated by precipitation. Efforts to use a dolomite product have not been successful due to lime impurities. Magnesium oxide is a strong accelerator and is used in white and light colored rubbers.

INORGANIC PIGMENTS — The

*Furnished by request by the Goodyear News Service, Goodyear Tire & Rubber Co., Akron, Ohio.

third class of chemicals used is for coloring purposes only. Lamp black being less jet black is preferred to gas black for greys. Ultramarine blue holds its color well and is used extensively. Yellows are obtained from zinc or lead chromates due to their stability during vulcanization and permanency. Greens are obtained by combining the yellow and blue elements. For red rubber, iron oxides and antimony sulphide are most frequently used. The use of pigments primarily to obtain color is not very extensive as it is generally agreed that other qualities such as strength and elasticity so completely out-weigh that of color, that the color is allowed to come as it may, and every effort is made to obtain the physical qualities best suited to the particular article being manufactured. In some cases, however, a special color is desirable. As in the case of pure fillers and accelerators it is most essential that the ingredients be finely divided.

Qualifications

A rubber manufacturer considers new materials in the following order as to their availability for fillers. (1) Uniformity; (2) Fineness of division; (3) Purity; (4) Compounding tests; (5) Source and continuity of supply; (6) Price.

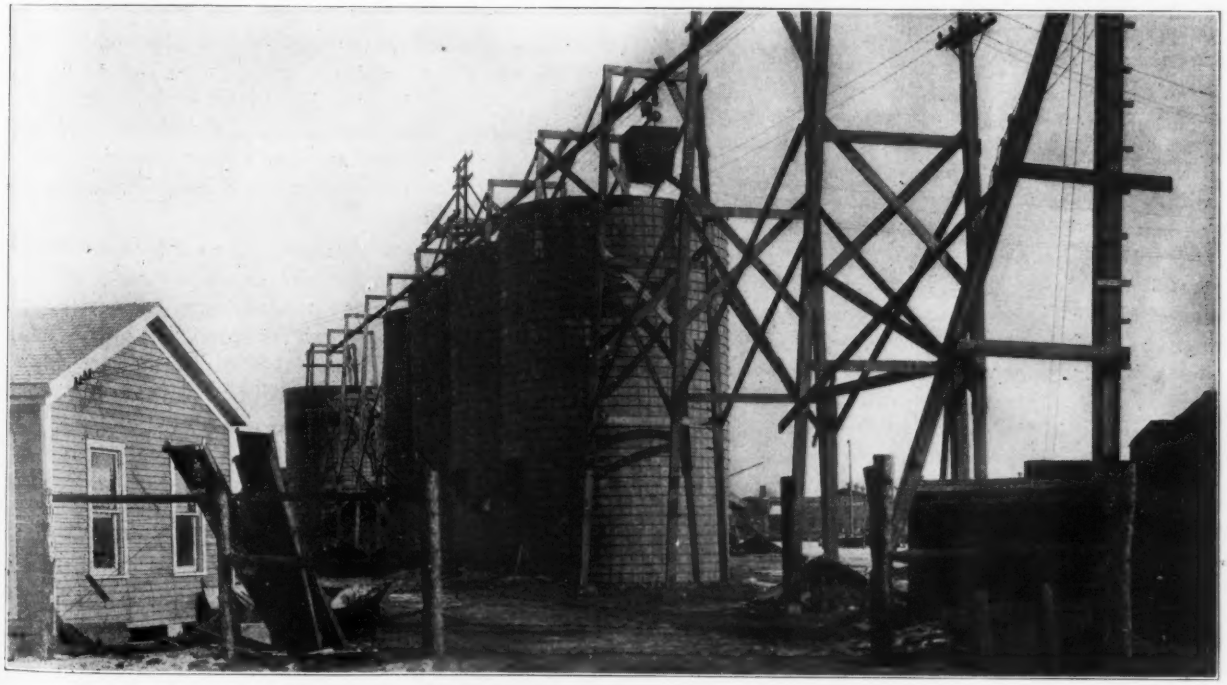
Concrete-Stave Bins

THE PARTICULAR BINS illustrated herewith were built by a coal dealer to store coal. But it is obvious that this kind of construction would be peculiarly well suited to the storage of sand, gravel and crushed stone. The concrete staves are easily manufactured on the job, the only items necessary besides the aggregates are the cement and the steel rods.

Steel bins of similar design and capacity have been used with success by both sand and gravel and crushed stone producers. The concrete-stone bins have the additional advantage of not being watertight, unless specially constructed so, and thus allow the sand to dry out, in which condition it will of course flow much more readily. Moreover, it is in the interest of mineral aggegate producers to exploit this new use for concrete.

Concrete-stave bins suitable for sand, gravel or stone

Each bin is 20 ft. in diameter and 13 staves, or 30 ft. 4 in. high. Sufficient reinforcement is provided by 9/16-in. rods encircling the pocket and placed 9⅓ in. apart. The staves for the pockets were manufactured in the plant of the Heim Cement Products Co. of North Liberty, Ind., which also had charge of the erection.



View of bins showing traveler method of filling them

All Aboard for Lime Convention!

Next Annual Meeting of the National Lime Association Promises to be a History Maker

HOTEL ASTOR, NEW YORK CITY, June 17 and 18. Every lime manufacturer in the United States and Canada should be there. The growing demand for lime, the car shortage, the freight rate increases, fuel problems and a host of other matters of vital importance to the lime industry will be taken up.

Some fifteen years ago at one of the early meetings of the Association in Chicago a prominent steel man remarked that if steel men did not know any more about steel and its manufacture and properties than lime men apparently knew about lime, then the steel industry would still be an infant industry. Fortunately fifteen years have shown some slight improvement, but the lime industry is still an infant, not in years but in capacity for helping itself.

The National Lime Association is leading the way to light. It is working out the ways and means of accomplishing a monumental task. That task is unearthing the whole truth about lime and its uses and at the same time promoting its use, where its use is already established. It is a problem of scientific study, investigation and research—and commercialism—in one, and the leaders of the lime industry believe they have solved it in the present organization of the National Association.

Certainly great progress has been made in the last few months. The character of the literature put forth has been made simple, scientific, dignified and convincing. With persistent and well-grounded efforts lime has achieved some remarkable triumphs in the last year, both in construction and in agriculture. After many and various attempts to dislodge its use, the place of hydrated lime in concrete is assured beyond all effects of future controversy. Many delusions regarding its use in agriculture are being dispelled.

Today the lime industry stands at the threshold of its greatest opportunity. Great new demands may be created if sufficient "pep" is put into the effort already started by the Association. The program printed below ought to help lime manufacturers to get acquainted with their product; but somebody must go a whole lot further and find out the properties of lime when used with other materials. In that field the researches of the chemical bureau of the Association prove there is an immense future. The following is the tentative program of Acting Secretary E. O. Fippin:

Thursday, June 17

A. M.
10:00—Assembly and roll-call of companies.
All representatives of each company stand.
Comments on Association work and suggestions for later consideration of convention.
10:20—Minutes of meetings of June, August, and October, 1919.
10:30—Address by President Warner:
Review of Association year and Association's ideals and aims.
10:45—Responses. Other angles of vision:
The Middle West—Colonel Cobb.
Northeast—G. B. Wood.
West—Mr. McMillin or Mr. Cadman.
South—Mr. Carson and Mr. Dittlinger.
11:15—Report of standing committees:
11:30—Appointment of convention committees:
11:45—Statistics of the lime industry:
(A) What they now show—Miss Munsell, 10 minutes.
(B) What the Industry Needs—B. L. McNulty and Henry M. Camp, 10 minutes.
(C) What we can get—Mr. Loughlin, U. S. Geological Survey, 10 minutes.
Discussion, 10 minutes.
12:30—Informal luncheon—all together.
P. M.
2:00—Demonstration on the New Electrolitic Lime Treatment of Sewage, F. N. Moersh, chemical engineer, Direct Oxidation Process Co., Philadelphia.
Discussion by Messrs. Shertzer, McNulty, McLanahan, Russell, Baker, Gager.
2:40—Paper on Investigation of the Uses of Lime in Construction, Needs, Problems, and Methods, W. E. Emley, U. S. Bureau of Standards.
Discussion by Messrs. Owen, McCallie, Mathews, Carson, Wood, Demorest, Durnell, Black.
3:20—Some Aspects of Lime in Agriculture, J. A. Slipher.
Discussion by Messrs. Carson, McIntire, Durnell, Nicholson, Cheney.
4:00—Association Publications—Their Type, General Distribution, and Use by Member Companies.
General discussion by Messrs. Daboll, Boland, Urschel, Wood, Camp, Stewart, Carson, Eikel

Friday, June 18

9:30—Secretary's report: Board meetings of year, central office operation, financial statements, comments, and discussion.
10:00—Treasurer's report and report of auditing committee.
10:10—District reports on selection of directors for ensuing year.
10:30—Review of departmental activities and projection of plans for ensuing year:
11:30—The Regional Bureau as a means of effective Association work.
Discussion:
General discussion by Messrs. Mathews, Owen, Carson, Curtis, McNulty.
12:30—Informal luncheon.
P. M.
1:45—Photo of convention.
2:00—Action on amendments.
2:15—Report of committee on advisory committee organizations.
2:25—Discussion.
2:40—Budgets by group minimums:
3:45—Determination of annual dues for 1920-21.
4:00—Election of officers.
4:30—New business.

Sand-Brick Brick

There probably never was a better opportunity than the present for sand-lime brick. Rapidly mounting labor and fuel costs have increased the differential in favor of the sand-lime brick and this differential will become more favorable with still further increases in the price of coal.

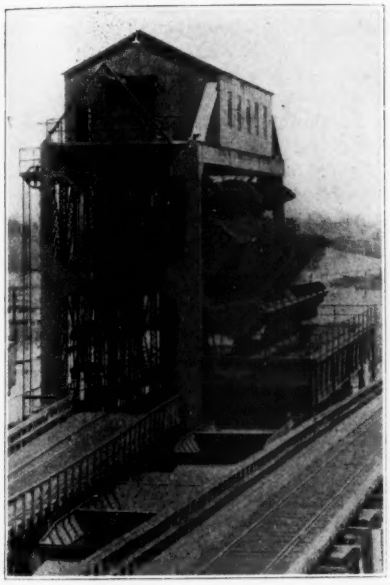
The sand-lime brick industry, like every new development, went through a period of stock-jobbing promotion which did the industry untold harm. Nevertheless, sand-lime brick has emerged from the ordeal as a meritorious building material and one that has found favor wherever a good product has had fair trial.

It offers a splendid and growing field for the consumption of high calcium lime and should have the active support of the lime industry. It is true there have been many failures in the sand-lime brick game, but that was before so much was known of the technology of the industry as now. Those plants which persisted in turning out a good product have established a good reputation for the sand-lime brick wherever it has been used extensively, and no sand-lime brick plant in operation today is suffering for lack of orders.

NEW MACHINERY AND EQUIPMENT

Latest in Car Dumpers

WHETHER THE QUARRY industries follow the Minnesota and Michigan iron range experience and keep on using heavier and heavier equipment, until they get something like the car dumper illustrated below, is a matter that will have to be settled by time. There is, of course, a very noticeable movement toward the use of larger and heavier equipment in quarries and gravel pits—larger and stronger shovels, larger cars and larger crushers.



Car dumper for two 50-ton cars
Pumping two 50-ton cars at a lick

According to L. J. Hewes, Chicago manager of the Traylor Engineering and Manufacturing Co., which has produced a successful 60-in. gyratory crusher, there is a strong probability of an 80-in. crusher in the near future. With an 80-in. crusher the average quarry-car load would not be a spoonful.

Will the solution be the use of standard railway equipment and car dumpers of the type shown? These car dumpers, made by the Wellman-Seaver-Morgan Co., Cleveland, Ohio, are now used to dump two standard 50-ton cars in one operation.

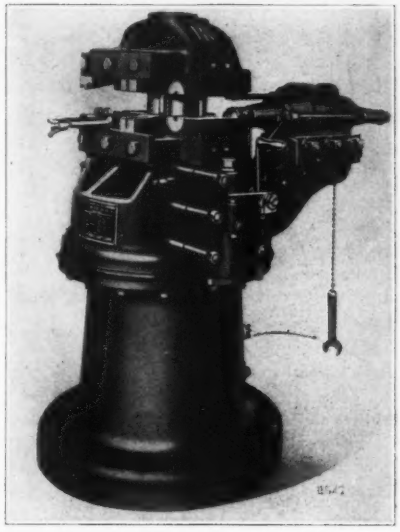
The Hawkeye Portland Cement Co., Des Moines, Ia., uses a single 50-ton car dumper of a similar type. This operation was described in ROCK PRODUCTS, December 20, 1919.

New Drill Steel Sharpener

A NEW compressed-air operated drill steel sharpener machine known as the I-R No. 50 Sharpener, has been developed by the Ingersoll-Rand Co., 11 Broadway, New York. This machine embodies a number of new and distinctive features.

This sharpener was designed primarily to rapidly and exactly sharpen and shank drill steel, such as cruciform steel up to 2 in. in diameter or round, hexagon, octagon, quarter-octagon, auger or spiral steel up to 1⅞-in. in diameter.

The single lever, which controls all of the operations of the machine, is fitted with a safety locking device. This prevents accidents due to the impossibility of operating the machine unless the lock is released—an excellent improvement. The throttle valve is of the balanced spool type, operating easily and quickly.

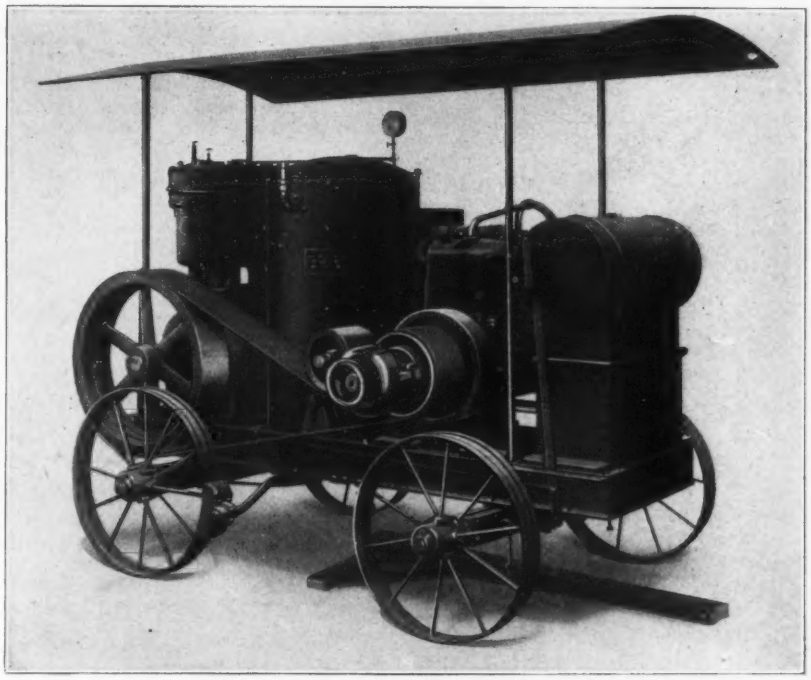


Compressed-air operated drill sharpener

Portable Air Compressor

THE NEWEST gasoline-engine driven portable air compressor to appear on the market is made by the Chicago Pneumatic Tool Co., Chicago, Ill.

The air end of this portable air-power unit consists of a two-cylinder single-acting air compressor having 8-in. diameter by 6-in. stroke water-cooled cylinders and plate valves. These valves have been designed for an operating speed of 400 revolutions per minute, and at this speed the capacity is 140 cu. ft. per minute.



New portable air compressor of Chicago Pneumatic Tool Co.

Quarry Accidents

THE COMPILATION of quarry accidents in the United States for the year 1918 has just been issued by the Bureau of Mines, Washington, D. C., Copies of this little bulletin are probably sent out annually to all known quarry operators.

Statistics are certainly dry reading and perhaps too many of these bulletins fail to receive the examination their importance entitles them to. While these statistics are the most complete obtainable, they are admittedly lacking in desirable completeness because of the lack of interest on the part of many quarrymen in making returns.

Many quarrymen fail to see that these statistics are gathered in their interest and that they are made use of by workmen's compensation insurance companies and commissions to fix the rates employers of quarry labor must pay. Hence it behooves each and every quarry operator to have the statistics complete and reliable, for otherwise wrong deductions are probable, and you can bet your hat that any such deductions are favorable to the insurance company rather than to the quarry man.

Comparative Hazards

The statistics of fatal accidents in quarries, metal mines and coal mines for the years 1911 and 1918, inclusive, show that quarrying is considerably less hazardous than any other kind of mining operation. The average number of men killed per year per 1,000 employed in the coal mining industry was 3.38 for the eight years noted; in the metal mining industry it was 3.78. During the same period the average number of men killed in the quarry industry per 1,000 employed was 1.77. In other words the mining industry is, apparently, twice as hazardous as quarrying.

It is well known that accident prevention work has made great headway in the mining industry and that many mines are now considered as safe places to work in as it is physically possible to make them. Therefore it is educational to compare the causes of fatal accidents in mines with those of quarries, to see in what ways the work already accomplished in the prevention of mine acci-

TABLE 24.—***Quarries, metal mines, and coal mines:*** *Principal causes of fatalities showing percentage due to each cause, by years, 1911 to 1918.*

	Cause of death.								
	Falls of overburden, roof, quarry material, ore, or coal.	Explosives.	Haulage and handling rock, ore, or coal.	Falls of persons.	Electricity.	Machinery.	Gas and dust explosions.	Other causes.	Total.
1911.									
Quarries	25.53	26.60	20.21	8.51	1.07	9.04	.....	9.04	100.00
Metal mines	32.52	11.22	7.63	15.39	2.45	3.16	.....	27.63	100.00
Coal mines	47.40	6.02	17.13	1.28	3.73	1.51	13.74	9.19	100.00
1912.									
Quarries	17.37	22.06	27.70	8.92	1.87	11.74	.....	10.33	100.00
Metal mines	34.49	14.22	10.28	13.92	3.78	3.78	.....	19.52	100.00
Coal mines	49.03	6.08	19.14	1.36	3.64	1.65	11.99	7.11	100.00
1913.									
Quarries	14.75	24.04	23.50	9.29	2.73	12.57	.....	13.12	100.00
Metal mines	34.70	13.03	12.88	12.30	3.81	4.39	.....	18.89	100.00
Coal mines	45.39	4.95	18.31	1.80	3.16	1.80	18.45	6.14	100.00
1914.									
Quarries	29.45	19.44	18.33	12.78	1.67	6.11	.....	12.22	100.00
Metal mines	36.32	10.73	10.20	16.10	3.04	2.50	.....	21.11	100.00
Coal mines	46.09	5.95	18.79	2.85	4.07	1.87	14.22	6.16	100.00
1915.									
Quarries	30.40	18.92	15.55	11.48	2.03	9.46	.....	12.16	100.00
Metal mines	36.71	14.10	10.49	15.91	2.53	1.99	.....	18.26	100.00
Coal mines	47.55	6.83	18.64	.37	4.36	1.68	13.40	6.17	100.00
1916.									
Quarries	19.08	16.18	19.66	8.09	4.05	16.76	.....	16.18	100.00
Metal mines	32.28	12.77	10.04	14.64	3.73	2.58	.....	23.96	100.00
Coal mines	47.84	6.56	20.89	1.39	4.36	1.89	10.15	6.92	100.00
1917.									
Quarries	18.32	16.03	24.43	11.45	1.52	15.27	.....	12.98	100.00
Metal mines	26.17	9.27	10.33	13.15	2.23	2.00	.....	36.85	100.00
Coal mines	45.18	4.12	22.11	.96	3.52	2.34	13.43	8.34	100.00
1918.									
Quarries	14.40	13.60	24.80	12.00	3.20	14.40	.....	17.60	100.00
Metal mines	29.72	13.78	13.00	12.85	3.87	3.25	.....	23.53	100.00
Coal mines	50.13	5.24	24.20	.81	3.99	2.21	5.01	8.41	100.00

You Cannot Buy It

YOU CANNOT BUY the accident prevention service of the National Safety Council. As a member you automatically acquire all of the Council's thoroughly organized weekly service. And its accumulation of data, and statistics—its magnificent experience is yours to use at will—in facilitating the safety effort of your plant.

The National Safety Council was organized as a co-operative association with the sole object of assisting the member plants to prevent accidents. The National Safety Council today—while greatly increased in size is still operating as a purely co-operative, non-profit making association with the same objective—accident prevention—as its goal.

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dents may be applied to create a still wider divergence between the percentage of accidents in each case. In other words, if the quarry industry of today with so little attention paid to scientific accident prevention is twice as safe an employment as mining with all its highly developed safeguards and methods, what can be done in the quarry industry to make it three or four times as safe as mining?

A study of the accompanying table may help. Eliminating falls of overburden, etc., which are hardly comparable in the two industries we find in the next column that fatal accidents from explosives up to the year 1918 have been far more common in quarrying than in mining. The improving record of the quarry industry since 1913 is clear proof of the results accomplished from a better knowledge of this branch of stone quarry operation and the progress made to avoid blasting accidents. Nevertheless much remains to be done.

The next column shows that nearly a fourth of all fatalities occur in haulage and handling of the rock—most of them probably in the operation of industrial railways. In this respect the quarry industry, where all work is done in the open, ranks as hazardous as the coal-mining industry with its underground railway systems and hauling of men and materials up and down shafts. Obviously there is a big field for improvement in the quarry industry here.

In the next two columns—falls of persons and electricity—the quarry industry is no worse than nearly every other, but in the next column—machinery—it will be seen at once that the quarry industry is far behind the times in proper methods of safety work. It is absolutely inexcusable that the fatal accidents due to machinery in quarry and crushing plants should be three to five times as many as in the mining industry. The perfectly obvious conclusion is that the attention mine operators have given this detail has reduced their accidents from that cause to a minimum, while quarry operators continue to permit dangerous conditions to exist. In nearly every state mining operations are state inspected and every possible machinery guard is insisted upon. Since the two operations are very similar it can be seen what proper precautions can do to reduce the death rate.

Canadian Quarries Active

HON. F. C. BIGGS, Minister of Public Works of the Province of Ontario, has announced that 1824 miles of provincial roads will be started this year. Investigation of the quarry resources of the province shows that stone is available without any long hauls which contribute so much to the increased cost of the highways. The stone problem is therefore solved to a large extent. The following table shows the location of the quarries and their capacities. A second table shows the increased capacities provided for recently by several plants. The Standard Crushed Stone Co., the Empire Limestone Co., John Maloney, and Christie-Henderson & Co., have been idle for three years but are preparing to operate at full capacity. The Canada Crushed Stone Co., Dundas, and the Queenston Quarry Co., St. David's, have installed storage systems. Twenty-one plants along the line of the roads to be built have a combined output of 12,000 tons per day. These are the

	Tons
Prescott Quarries, Prescott	Under construction
Ontario Rock Co., Co., Havelock	
Quinlan & Robertson, Crookson	300
Britnell & Co., Ltd., Burnt River	400
Point Anne Quarries, Point Anne	2000
Crushed Stone, Ltd., Kirkfield	1000
National Potash Co., Gravenhurst	500
Washago Quarry Co., Washago	300
Ontario Stone Corp., Uhthoff	400
Oliver Rogers Stone Co., Owen Sound	400
Thames Quarry Co., Ltd., St. Mary's	500
Canada Crushed Stone Corp., Dundas	3000
Hagersville Crushed Stone Co., Hagersville	500
Hagersville Contracting Co., Hagersville	500
Wentworth Quarry Co., Ltd., Vinemount	500
Empire Limestone Co., Sherkston	800
Standard Crushed Stone Co., Windmill Point	400
Queenston Quarry Co., St. David's	300
Standard Crushed Stone Co., St. David's	300
John Maloney, Puslinch	300
Christie Henderson Co., Puslinch	200

Improvements are being made at various plants as follows:

Ontario Rock Co., Havelock—Increasing capacity.

Crookston Quarries, Ltd., Crookston—Building large modern plant.

Queenston Quarry Co., St. David's—Built 10,000 tons storage.

Canada Crushed Stone Corp., Dundas—Built 60,000 tons storage.

Wentworth Quarry Co., Vinemount—Increasing capacity.

Oliver-Rogers Stone Co., Owen Sound—Increased plant.

Hagersville Crushed Stone Co., Hagersville—New additional crusher and other improvements.

Hagersville Contracting Co., Hagersville—New shovel and other additions.

Thames Quarry Co., St. Mary's—New steam shovel and increased to 1,000 tons.

Ontario Stone Corp., Uhthoff—Doubled capacity.

Point Anne Quarries, Point Anne—Increase 650 to 2,000 tons.

Crushed Stone, Ltd., Kirkfield—Increase from 500 to 1,000 tons.

Britnell & Co., Burnt River—Increase from 150 to 300 tons.

Rates on Cement

THE INTERSTATE COMMERCE COMMISSION has dismissed Case No. 10620, Riverside Portland Cement Co. vs. Riverside, Rialto & Pacific et al., opinion No. 6133, 57 I. C. C. 291-3, holding that rates on cement from Crestmore, Cal., to Miami and other destinations in Arizona had not been shown to be unreasonable and the complainant had not shown that it was damaged by the undue prejudice said to have existed prior to October 25, 1916, on which day the carriers brought the rates from Crestmore to the basis of rates from Colton, Cal., to the same destinations. The Santa Fe, in 1915, put Crestmore and Colton on a parity, but the Southern Pacific did not meet the competition of the Santa Fe until about a year later.

Los Angeles Would Guard Against Monopoly

THE LOS ANGELES CITY COUNCIL has refused the requests of several sand and gravel companies for exclusive rights to haul sand and gravel from the Los Angeles River on the ground that it would be creating a monopoly that would not operate to the interests of the city.

It has been the custom of the Board of Public Works to sell sand and gravel from the river bed to contractors and private citizens who desired to build at ten cents per cubic yard. Recently offers were made by several gravel companies for the exclusive right to haul sand and gravel from the river bed, including an offer of 30 cents per yard made by the Los Angeles Rock and Gravel Co. These offers were referred to the city attorney and were very positively declined.

Charles H. Treat, of the Board of Public Works, declared "that the municipally-owned river bed was for the use of all and to grant an exclusive right to any company or individual to haul sand or to erect bunkers would create a monopoly and have a tendency to increase the cost of building materials. Even though the city might receive more revenue through a private monopoly, it would be to the detriment of public interests and deprive the City of Los Angeles of one of the most vital resources in the upbuilding of the city."

Southard Leaves U. S. Gypsum Company for Oil Business

GEORGE L. SOUTHARD, well known to the gypsum plaster trade, has resigned his position with the U. S. Gypsum Co. at Chicago to go into the oil business at Oil City, Penn. Mr. Southard is a son of the founder of the Southard Gypsum Company at Southard, Okla., which was purchased by the U. S. Gypsum Co.

The Rock Products Market

Wholesale Prices of Crushed Stone

Prices given are per ton, F. O. B., at producing plant or nearest shipping point

Crushed Limestone

City or shipping point	Screenings, ¼ inch down	½ inch and less	¾ inch and less	1½ inch and less	2½ inch and less	3 inch and larger
EASTERN:						
Buffalo, N. Y.			1.40 per net ton, all sizes			
Burlington, Vt.	1.00		2.50	2.00	2.00	
Coldwater, N. Y.	1.80	1.80	1.80	1.65	1.65	2.00@2.25§
Grove, Md.	1.45	2.50	2.40	2.00	1.60	1.45
North Leroy and Akron, N. Y.	1.00	1.00	1.00	1.00	1.00	1.00‖
Utica, N. Y.	1.00		All other sizes 1.50			
CENTRAL:						
Alden, Ia.	.80	1.50	1.50	1.45		
Alton, Ill.	2.00	1.75	1.75	1.75	1.75	
Bettendorf, Ia.			1.50 per cu. yd., all sizes			
Chicago, Ill.	1.20	1.60	1.30	1.20	1.30	1.20
Cincinnati, Ohio		2.00	2.00	2.00		
Cleveland, Ohio		2.40	2.20	2.20		
Davenport, Ia.	1.50*	1.50*	1.50*	1.50*		
Dundas, Ont.	.75	1.50	1.50	1.35	1.25	1.20
Eden and Knowles, Wis.	1.20	1.20	1.20	1.20	1.20	
Elmhurst, Ill.	1.00@1.25	1.00@1.25	1.00@1.25	1.00@1.25	1.00@1.25	1.00@1.25
Ft. Wayne, Ind.	1.60	1.90	1.90	1.80	1.60	1.60
Greencastle, Ind.	1.25	1.25	1.10	1.10	1.10	1.10
Hull, Canada	2.50	2.30	2.50	2.10	2.00	1.75
Illinois, Southern	2.00	1.50	1.50	1.50	1.50	
Kokomo, Ind.	1.15	1.25	1.25	1.20	1.10	1.10
Krause, or Columbia, Ill.	1.80	1.30	1.50	1.40	1.30	1.30
Lannon, Wis.	1.25	1.25	1.25	1.25	1.25	1.25
Lima, Ohio	1.40	1.40	1.40	1.40	1.40	1.40
Mansfield, Ohio	1.70	2.20	2.00	1.90	1.70	1.70
Mayville, Wis.	1.00		1.20@1.25	1.20@1.25	1.20	1.10
Montrose, Ia.	1.25	1.65	1.75	1.65	1.65	
Oshkosh, Wis.			1.40 per ton, all sizes			
River Rouge, Mich.	1.25	1.50	1.50	1.50	1.50	1.25
Silica, Ohio	1.00	1.50	1.30	1.20	1.00	1.00
St. Louis, Mo.	.60	1.60				
Toledo, Ohio, f. o. b. cars	1.60	2.10	1.90	1.80	1.60	1.60
Toronto, Canada	1.55	2.25	2.25	2.25	2.05	2.00
Winnipeg, f.o.b. cars	2.50*	1.85*	2.85*	2.50*		
SOUTHERN:			These prices include 90c freight			
Brooksville, Fla.	1.50			3.00		
Cartersville, Ga.		2.75	2.75	2.75	2.75	2.75
Chickamauga, Tenn.	1.50	1.75	1.75	1.75	1.75	1.75
El Paso, Tex.	1.00	1.00	1.00	1.00		
Fort Springs, W. Va.	1.25	1.45	1.85	1.75	1.50	1.40
Mascot, Tenn.		1.50	1.50@1.75	1.50@1.75	1.50@1.75	
Memphis Jct., Ky.			1.10@1.35, all sizes			
New Braunfels, Tex.	.60	1.75	1.65	1.50	1.50	1.50
WESTERN:						
Atchison, Kans.	.50	2.00	2.00	2.00	1.90	1.90
Blue Springs and Wymore, Neb.	.20	1.85	1.85	1.75@1.80	1.65@1.70	1.60
Kansas City, Mo.	.60	2.00				
Mankato, Minn.				1.75	1.50	
Terminous, Calif.		1.00			.90	

Crushed Trap Rock

City or shipping point	Screenings, ¼ inch down	½ inch and less	¾ inch and less	1½ inch and less	2½ inch and less	3 inch and larger
Bernardsville, N. J.	2.00	2.20	2.00	1.80	1.50	
Branford, Conn.	.80	1.75	1.65	1.45	1.25	
Birdsboro, Pa.	1.40	1.90	1.80	1.60	1.40	1.40
Bound Brook, N. J.	2.00@2.10	2.20@2.30	2.00@2.10	1.80@1.90	1.40@1.50	
Dresser Jct., Wis.	.75	2.50	2.45	2.15	2.00	2.00
Duluth, Minn.	1.00	2.25	2.00	1.50	1.50	
E. Summit, N. J.	2.10@2.20	2.35@2.50	2.10@2.20	1.80@1.90	1.75@1.80	
Glen Mills, Pa.	1.00	1.35	1.70	1.55	1.35	1.35‖
Millington and Paterson, N. J.	1.80	2.20	2.00	1.80	1.60	
New Britain, Middlefield, Rocky Hill, Meriden, Conn.	.60@1.00	1.60@1.80	1.60@1.80	1.40@1.50	1.20@1.30	
Westfield, Mass.	.60	1.35	1.30	1.20	1.10	

Miscellaneous Crushed Stone

City or shipping point	Screenings, ¼ inch down	½ inch and less	¾ inch and less	1½ inch and less	2½ inch and less	3 inch and larger
Dundas, Ont.—Flint	1.10	1.10	1.10	1.10	1.10	1.10
Mayville, Wis.	.90@1.00	1.10@1.25	1.10@1.25	1.10@1.25	1.10@1.25	1.10@1.25
Middlebrook, Mo.—Granite	4.00	2.00	2.00			1.50‡
Portland, Maine—Granite	1.50			1.35	1.25	
Roseburg, Ore.		1.50	1.25	1.05	1.00	1.00
Stockbridge, Ga.—Granite	.50	2.00	1.90	1.75	1.75	
White Haven, Pa.—Sandstone	.85	1.20	1.40	1.20	1.20	1.20‖
Granite	1.25		1.50	1.50	1.50	

*Cubic yard. †Agrl. lime. ‖R. R. ballast. §Flux. ‡Rip-rap. a 3-inch and less.

Agricultural Limestone

EASTERN:

Coldwater, N. Y.—Analysis, 56.77% $CaCo_3$, 41.74% $MgCo_3$—70% thru 200-mesh, 95% thru 40-mesh; bags, $5.00; bulk 3.25

Chaumont, N. Y.—Analysis: $CaCo_3$, 92 to 98%; $MgCo_3$, 1.51%—(Thru 100 mesh); sacks, 4.00; bulk 2.50

Grove City, Pa.—Analysis: $CaCo_3$, 94.75%; $MgCo_3$, 1.20%—(70% thru 100 mesh); 80 lb. ppr., 4.60; bulk 3.25

Grove, Md.—(50% thru 50 mesh); paper bags, 6.75; bulk 5.00

Hillsville, Pa.—Analysis, $CaCo_3$, 96% (70% thru 100 mesh); sacks, 4.50; bulk 2.75

Jamesville, N. Y.—68% thru 100 mesh; 95% thru 50; 100% thru 20. Sacks, 3.75; bulk 2.25

Syracuse, N. Y.—Analysis, 90% carbonates (50% thru 100 mesh, 90% thru 50 mesh); sacks, 3.50; bulk 1.75

Walford, Pa.—(70% thru 100 mesh; 85% thru 50; 50% thru 50; 100% thru 4); sacked, 4.25; bulk 2.75

West Stockbridge, Mass.—Analysis: Combined carbonate, 95%—33% thru 200 mesh; 66% thru 100; 100% thru 40. **Bulk** 2.85

Williamsport, Pa.—Analysis, $CaCo_3$, 88-90%; $MgCo_3$, 3-4%—(50% thru 50 mesh); bulk 4.00

CENTRAL:

Alden, Ia.—Analysis, $CaCo_3$, 99.16%; bulk ..... .80

Alton, Ill.—Analysis: $CaCo_3$, 96%; $MgCo_3$, 0.75%—50% thru 4 mesh 2.50

Bedford, Ind.—(90% thru 10 mesh) Analysis, $CaCo_3$, 98.5%; $MgCo_3$, 0.5% 1.75

Belleville, Ont.—Analysis, $CaCo_3$, 90.9%; $MgCo_3$, 1.15% (45 to 50% thru 100 mesh; 61 to 70% thru 50 mesh); bulk 2.50

Chicago, Ill.—Analysis, $CaCo_3$, 53.63%; $MgCo_3$, 37.51%—90% thru 50 mesh 1.00

Columbia, Ill., near East St. Louis (½" down) ..... 1.25@1.80

Ellettsville, Ind.—Analysis, Carbonate, 98% 2.00

Elmhurst, Ill.—(Analysis, $CaCo_3$, 35.73%; $MgCo_3$, 20.69%) 50% thru 50 mesh 1.25

Greencastle, Ind.—(Analysis, $CaCo_3$, 98%) 50% thru 50 mesh 1.75

Howenstein, O.—100% thru 10 mesh; 59% thru 50; 39% thru 100 ..... 2.75@3.00

Kansas City—(50% thru 50 mesh) 2.00

Lannon, Wis.—(90% thru 50 mesh) Analysis, 54%, $CaCo_3$; 44%, $MgCo_3$ 2.00

Marblehead, O.—(Analysis: $CaCo_3$, 95.33%) 100% thru 100 mesh, sacks, 4.75; bulk 2.75

McCook, Ill.—Analysis, $CaCo_3$, 54.10%; $MgCo_3$, 45.04%—100% thru ¼-in. sieve; 78.12% thru No. 10; 53.29% thru No. 20; 38.14% thru No. 30; 34.86% thru No. 50; 22% thru 100 ..... 1.50

Milltown, Ind.—Analysis, $CaCo_3$, 94%; $MgCo_3$, 3%—(100% thru 4 mesh) 1.50

Montrose, Ia.—(90% thru 100 mesh) 1.25

Piqua, O.—Analysis: $CaCo_3$, 82.8%; $MgCo_3$, 8.2%; neutralizing power in terms of calcium carbonate, 95.3%—50% thru 100 mesh; bulk ..... 2.75@4.50

Rockford, Ill. 1.50

Stolle, Ill. (near East St. Louis on I. C. R. R.)—(Thru ½" mesh) Analysis, $CaCo_3$, 89.61 to 89.91%; $MgCo_3$, 3.82% 2.00

St. Paul, Ind.—Analysis, $CaCo_3$, 85%; $MgCo_3$, 12% 1.50

Stone City, Ia.—Analysis, $CaCo_3$, 98% (50% thru 100 mesh) ..... .80

Toledo, O.—Analysis, $CaCo_3$, 52.72%; $MgCo_3$, 43%—(20% thru 100 mesh); 30% thru 50; 80% thru 100; 100% thru 5/32 screen) 1.80

Whitehill, Ill.—Analysis, $CaCo_3$, 96.12%; $MgCo_3$, 2.50%—50% thru 100 mesh 2.00

(Continued on next page.)

Agricultural Limestone

(Continued from preceding page.)

SOUTHERN:

Cartersville, Ga.—Analysis: 96 to 98% combined carbonates — All thru 10 mesh with all dust in 2.75

Claremont, Va. (Marlime) — Analysis, 90.94% $CaCo_3$, 0.31% P., 1.36% Mg., 0.37% K.; bulk 4.50
100 lb. ppr. bags 6.00
100 lb. cloth bags 6.50

Dittlinger, Tex. — Analysis, $CaCo_3$, 99.09%; $MgCo_3$, .04%.
90% thru 100 mesh 2.00
90% thru 4 mesh 1.00

Grovania, Ga.—Analysis, $CaCo_3$, 95%; $MgCo_3$, none—50% thru 100 mesh 2.50

Hopkinsville, Ky.—Analysis, 94.6 to 98.1% $CaCo_3$—Bulk 2.00

Linnville Falls, N. C. — Analysis, $CaCo_3$, 54%; $MgCo_3$, 42%—50% thru 100 mesh; sacks, 4.00; bulk 2.50

Marion, Ga.—Analysis, 90% $CaCo_3$—(50% thru 100 mesh) 2.00

Memphis Jct., Ky.—(Analysis, $CaCo_3$, 95.31%; $MgCo_3$, 1.12%); average price, ½ in. down 2.00

Mascot, Tenn.—Analysis, $CaCo_3$, 52%; $MgCo_3$, 38%.
(80% thru 100 mesh) 2.75
(All thru 10 mesh) 2.25
(80% thru 200 mesh) 4.00
Paper bags, $1.50 extra per ton; burlap, 2.00 extra per ton.

Maxwell, Va. 2.50

Mountville, Va.—Analysis, $CaCo_3$, 76.6%; $MgCo_3$, 22.8%—100% thru 20 mesh; sacks, 6.00; bulk 5.00

Ocala, Fla. — Analysis, $CaCo_3$, 98%—(75% thru 200 mesh) 4.50

Tyrone, Ky.—Analysis, $CaCo_3$, 90%; $MgCo_3$, 4%—90% thru 4 mesh ..... 1.75@2.25

Winnfield, La.—(50% thru 50 mesh) 3.00

WESTERN:

Coalinga, Calif.—50% thru 50 mesh 4.00

Colton, Calif.—Analysis: $CaCo_3$, 95%; $MgCo_3$, 1½% (all to pass 14 mesh) —bulk, 3.50; bags 4.50
Sacks, 15c extra, returnable.

Kansas City, Mo., Corrigan Sid'g—50% thru 50 mesh; bulk 1.35

Terminous, Calif.—Analysis, 94% $CaCo_3$, 1.4% $MgCo_3$—(60% thru 200 mesh; 90% thru 100 mesh; 100% thru 40 mesh); sacks, 6.00; bulk 5.25

Miscellaneous Sands

Silica sand is quoted washed, dried and screened, unless otherwise stated.

GLASS SAND:

Berkeley Springs, W. Va. ..... 2.50@3.00
Special hand selected rock **2.50**
Fridgeton, N. J. **2.00**
Cedarville and South Vineland, N. J.—
Glass, damp **2.00**
Glass, dry **2.50**
Gray Summit, Mo. ..... 2.50@3.00
Guion, Ark.—Carlots 2.50
Hancock, Md.—Damp 2.00
Klondike and Pacific, Mo.:
Contracts 2.00
Carlots **3.00**
Mapleton, Pa. 3.00
Glass, damp 2.50
Massillon, Ohio 3.50
Michigan City, Ind. ..... .75
Millington, Ill.—Contracts 2.00
Mineral Ridge, O. 3.50
Montoursville, Pa.—Green, washed ..... 2.00@2.75
Oregon, Ill.—**Large contracts** **2.00**
Open market 2.50
Ottawa, Ill. ..... 2.00@2.50
Robinson, Md., washed, screened, not dried **2.00**
St. Marys, Pa.—Green **2.50**
Sands, Elk Co., Pa.—Selected, green 3.00
Thayers, W. Va.—Washed 3.50
Dried 4.00
Tygarty, Ky.—Washed, not dried 2.60
Utica, Ill. ..... 1.75@2.50

FOUNDRY SAND:

Albany, N. Y.—Core ..... 1.25@2.00
Furnace lining ..... 2.25@2.50
Molding, fine coarse and brass ..... 2.50@2.75
Sand blast ..... 3.75@4.50
Allentown, Pa.—Core ..... 1.50@1.75
Molding coarse **1.50**
Arenzville, Ill.—Molding fine ..... 1.75@2.00
Beach City, Ohio—Core 2.75
Furnace lining and sand blast 3.00
Molding fine and coarse ..... 2.50@3.00

(Continued on next page)

Wholesale Prices of Sand and Gravel

Prices given are per ton, F. O. B., at producing plant or nearest shipping point

Washed Sand and Gravel

City or shipping point	Fine sand, 1/10 inch down	Sand, ¼ inch and less	Gravel, ½ inch and less	Gravel, 1 inch and less	Gravel, 1½ inch and less	Gravel, 2 inch and less
EASTERN:						
Ambridge, South Heights, Pa.	.....	1.30	.....	1.30	1.00	1.00
Attica, N. Y.	.75	.75	.75	1.00	1.00	1.00
Farmingdale, N. J.	.68	.48	1.50	1.35	1.35	1.30
Hartford, Conn.	.90	.....	1.25	1.15	1.15	1.15
Leeds Junction, Me.	.....	.50@ .60	1.75@2.00	1.50	.....	1.35
Ludlow, Mass.	.....	.75*	.....	1.70*	1.50*	1.50*
Morristown, N. J.	.60	.60	1.75	.....	1.40	1.35
Washington, D. C.	.75	.75	2.00	1.40	1.20	.....
CENTRAL:						
Alton, Ill.	.60@ .75	.60@ .75	1.50@4.50	1.30	1.20	1.20
Anson, Wis.	.....	.60@ .70	.....	1.25@1.50	.....	1.00@1.20
Attica, Covington, Silverwood, Ind.	.85	.85	.85	.85	.85	.85
Barton, Wis.	.85	.70	1.00	.80	.80	.80
Chicago, Ill.	.....	1.20@1.50	.....	1.20@1.50	.....	.....
Columbus, Ohio	.....	.70	1.00	.70	.70	.70
Des Moines, Ia.	.75@1.00	.75	1.65	1.65	1.50	1.50
Earlestead (Flint), Mich.	.60	.70	.....	1.05	.95	.95
Eau Claire, Wis.	.....	.60@ .70	.....	1.25@1.50	.....	1.00@1.25
Elgin, Ill.	.....	.80	1.00	.80	.80	.80
Elkhart Lake, Wis.	.60	.60	1.00	.....	.84	.....
Ft. Jefferson, Mechanicsb'g, O.	.70	.60	.60	.80	.70	.70
Grand Rapids, Mich.	.....	.60	.....	.90	.83	.83
Greenbush, Mich.	.50	.80	1.00	1.25	1.25	.....
Indianapolis, Ind.	.60	.60	.....	1.50	.75	.75
Le Mars, Ia.	.....	.90	.....	1.60	1.60	.....
Mason City, Ia.	1.00	.90	2.00	1.85	1.75	1.65
Milwaukee, Wis.	1.20	1.20	1.30	1.30	1.30	1.30
Minneapolis, Minn.	.50	.50	2.00	2.00	1.75	1.75
Moline, Ill.	.80	.80	.....	1.20	1.20	1.20
Oxford, Mich.	(60-40 mix, .95 per ton)					
Pittsburgh, Pa.	(Sand, 1.30; gravel, 1.00)					
Saginaw, Mich., f. o. b. cars	1.30	1.30	2.20	1.95	1.85	1.85
St. Louis, Mo., f. o. b. cars	1.50	1.55	1.70	1.50	1.45	1.45
Terre Haute, Ind.	1.00	1.00	.....	1.00	1.00	1.00
Toledo, Ohio	.75	.75	.....	.....	.....	.....
Winnipeg, f. o. b. cars	2.00 per cu.yd.					
Yorkville, Moronts, Oregon and Ottawa, Ill.	.70	.80	.90	.80	.80	.75
SOUTHERN:						
Knoxville, Tenn.	1.15	1.15	1.50	1.50	1.50	1.40
Lake Weir, Fla.	.....	.75	.....	.....	.....	.....
Lincoln, Neb.	.90	.90	2.20	2.20	.....	.....
Macon, Ga.	.....	1.00	.....	.....	.....	.....
Memphis, Tenn.	1.40	1.40	1.50	.....	.....	1.50
N. Martinsville, W. Va.	.....	1.10	.....	.....	1.00	.....
New Orleans, La.	.75	.75	2.50	.....	1.50	1.50
Pelzer, S. C.	.80	.....	.....	.....	.....	.....
Pine Bluff, Ark.	1.25	.95	Concrete gravel, all sizes, 2.00			
Pueblo, Colo.	.95*	.75*	.....	.....	1.50*	2.00*
Roseland, La.	.....	.35	.....	.....	1.25	.....
Tulsa, Okla.	.....	.70	.....	.....	.....	.....
Waco, Texas	.70@ .80	.70@ .80	.....	.....	.....	1.10
WESTERN:						
Grand Rapids, Wyo.	.50	.50	.85	.85	.80	.80
Kansas City, Mo.	(Kaw River sand, car lots, .75 per ton, Missouri River, 1.50)					
Niles, Calif.	1.00	1.00	.90@1.10	.85@1.00	.85@1.00	.85@1.00
Saratoga, San Jose, Calif.	.....	.60@ .75	.60@ .70	.60@ .70	.60@ .70	.60@ .70
Seattle, Wash.	1.25	1.25	2.00	1.25	1.25	1.25
Vancouver, B. C.	.....	1.30*	.....	1.30*	.....	1.10*
Yorkville, Ore.	.60	.60@ .75	.70	.60@ .75	.60	.50@ .60

Bank Run Sand and Gravel

City or shipping point	Fine Sand, 1/10 inch down	Sand, ¼ inch and less	Gravel, ½ inch and less	Gravel, 1 inch and less	Gravel, 1½ inch and less	Gravel, 2 inch and less
EASTERN:						
Boonville, N. Y.	.60@ .85	.60@ .80	.....	1.00	.90	.90
Burnside, Conn.	.80*	.....	.....	.....	.....	.....
Fishers, N. Y.	.....	.85@1.00	.....	.....	.85@1.00	.....
Yardville, N. J.	.....	.50@ .75	.....	.....	.....	.....
York, Pa.	.....	1.10@1.30	(crushed rock sand)			
CENTRAL:						
Earlestead, (near Flint, Mich.)	.60 per yd.					
Ft. Jefferson, Mechanicsb'g, O.	.70	.60	.60	.....	.....	.....
Grand Rapids, Mich.	.....	.40	.....	.75	.80	.60
Greenbush, Mich.	.65	.....	.....	.....	.....	.....
Hersey, Mich.	.....	.....	.....	.60	.....	.....
Illinois, Northern	.....	.....	.....	.....	.....	.50@ .60
Janesville, Wis.	.....	.65	.....	.....	.75	.....
Lincoln, Neb.	Sand gravel mix, 1.30					
Moline, Ill.	.....	.80	.....	.....	.....	1.00
Oxford, Mich.	Including cobbles, $1.00 per yd.					
Saginaw, Mich., f. o. b. cars	.....	.75	1.30	1.30	1.30	1.30
St. Louis, Mo., f.o.b. cars	1.60	1.60	1.60	1.60	1.60	1.60
Summit Grove, Ind.	.65	.65	.65	.65	.65	.65
Toledo, Ohio	.....	.....	.....	.....	.75	.....
Yorkville, Oregon, Moronts and Sheridan, Ill.	.....	.....	.....	.....	.....	.65
SOUTHERN:						
Albany, Ga.	.70@1.00	.....	.....	.....	.....	.....
Dudley, Ky. (Crushed Sand)	.....	1.05	.....	1.00	.....	.....
Lindsay, Tex.	.....	.....	.....	.....	.50	.....
Valde Rouge, La.	.....	.....	.....	.....	.....	.60@ .75
Waco, Texas	.....	.....	.....	.....	.....	.95
WESTERN:						
Pueblo, Col.	River Run, .75* unscreened					
Saratoga, San Jose, Calif.	.....	.60@ .75	.60@ .70	.60@ .70	.60@ .70	.60@ .70
Yorkville, Ore.	.....	.40	.....	.....	.40	.....

* Cubic yard. B Bank. L Lake. || Ballast.

Crushed Slag

City or shipping point	Roofing	Screenings, ¼ inch down	½ inch and less	¾ inch and less	1½ inch and less	2½ inch and less	3 inch and larger
EASTERN:							
Bethlehem and Emaus, Pa.	2.50	.90	1.50	1.00	1.00	1.00	1.00
Buffalo, N. Y.	2.00	1.00	1.00		1.00	1.00	1.00
Cleveland, Ohio.		**.85**		**1.05**	**1.05**	**.95**	**.95**
E. Canaan, Conn.	4.00	1.10	2.00	1.50	1.50	1.35	
Erie, Pa.		1.25	1.25		1.25	1.25	1.25
Emporium, Pa.		1.25	1.25		1.25	1.25	1.25
Ensley, Ala.	2.05	1.00	1.25	1.25	1.25	1.00	.95
Hokendaugua and Donaghmore, Pa.	2.50	.90	1.50	1.00	1.00	1.00	1.00
Lebanon, Pa.	2.50	.85	1.50	.85	.85	.85	.85
Philadelphia Dist.	2.50	1.20	1.50	1.20	1.20	1.25	1.25
Pittsburgh, Pa., Dist.	2.05	1.15	1.50	1.15	1.15	1.15	1.15
Sharpsville and Struthers, Pa.	2.00	1.20	1.60	1.20	1.20	1.20	1.20
CENTRAL:							
Chicago, Ill.			All sizes, $1.50, F. O. B. Chicago				
Detroit, Mich.			All sizes, 1.65, F. O. B. Detroit				
Ensley, Ala.	2.05	1.00	1.10	1.25	1.25	1.00	.95
Ironton and Jackson, O.	2.00	1.25	1.60	1.25	1.25	1.25	1.25
Toledo, O.			All sizes, 2.00, F. O. B. Toledo				
Youngstown, Dover, Hubbard and Leetonia, O.	2.00	1.20	1.60	1.20	1.20	1.20	1.20

Agricultural Lime and Hydrate

	—Agricultural Lime— Bulk	Bags	Per Cent CaO	Per Cent MgO	Agricultural Hydrate Bags
EASTERN:					
Adams, Mass.			98	38	8.00
Bellefonte, Pa.	8.50		98.5	.72	11.50
Berkeley, R. I.		14.00	45	15	
Bridgeport, Pa.	**7.50@9.00**		55	44	9.00@11.00
Cavetown, Md.	8.50				
Cedar Hollow, Devault, Rambo and Swedeland, Pa.	8.00	10.75 grd.	58	38	10.75
Chippewa, Pa.	6.00		78.67	1.33	
Farnams, Mass.	6.00	7.50	60	2	
Frederick, Md.	7.75		88	5 to 8	10.50
Grove, Md.	**8.00**				**10.75**
Highgate Springs, Vt.		**8.00**	**85**	**2**	
Hollidaysburg, Pa.	5.50@7.50		94.68		
Hyndman, Pa.	5.00	8.50	80.23	2.87	
Lime Kiln, Md.	**8.00**	**10.75**			**10.75**
Lime Ridge, Pa.	5.25@6.50		80.56-62.56	3.87-1.75	
Newburgh, N. Y.			57	38	8.00
New Castle, Pa.	**3.50**	**4.50**	**47.6 to 50.4**	**0.62 to 1.12**	
Rosendale, N. Y.	8.00	9.00	92	5	
Sandyville, O.					9.00
Union Bridge, Md.	8.50		73	1	**10.75**
Williamsport, Pa.	6.50		62-68	2-3	11.00
York, Pa.	8.00		90-95	2-7	10.75
CENTRAL:					
Alton, Ill.	10.50		94.0		
Delaware, O.			50.0	5-12	10.50
Forest, O.	7.50				
Knowles, Wis.		9.00	55	45	11.50
Manistique, Mich.	11.00		95	2	11.00
Mitchell, Ind.					12.50
Sheboygan, Wis.	5.50	8.50	58	40.5	
Springfield, Ohio			33.62	17.73	10.50
Woodville, Ohio			46-50	30-35	13.00
SOUTHERN:					
Blowers, Fla.	**5.00**	**7.25**	**98.0**		
Burns, Tenn.	10.00		96	0.54	14.00
Chippewa, Fla.	5.00		80.0	15.0	
Dittlinger, Texas		9.00@11.00	98.62	0.29	12.50@15.00
Erin, Tenn.	9.50		97.82	0.12	
Knoxville, Tenn.	2.50				**14.00**
Lushing, Va.	**9.00**	**11.25**	**60**	**15**	**12.75**
Maxwell, Va.	6.00	9.00	88	1.75	
Newala, Ala.	8.50@9.00		99.33		
Ocala, Fla.	4.00	6.00 pulv.	98½ (dry basis)		
Staunton, Va.	7.50	10.00	80.00	15.00	
WESTERN:					
Colton, Calif.	4.50		97	2	15.00
Kirkland, N. Mex.	15.00				
San Francisco, Calif.			96	0.33	15.00
Tehachapi, Cal.	**6.00**	**8.00**	**96**	**2**	

Miscellaneous Sands

(Continued from preceding page)

Bowmantown, Pa.—Core	**1.50**
Molding, coarse	**2.00**
Bridgeton, N. J.—Core	**2.00**
Cleveland, O.—Molding coarse	2.50
Brass molding	2.50
Molding fine	2.00@2.50
Core	1.50@2.00
Columbus, O.—Core	**2.00**
Brass molding	**2.50**
Molding fine, steel molding	**2.50**
Conneaut, O.—Molding fine	2.25@2.50
Molding coarse	2.00@2.25
Delaware, N. J.—Molding fine	2.00
Molding, coarse	**1.90**
Brass Molding	**2.15**
Eau Claire, Wis.—Core	.70
Roofing gravel	2.25
Sand blast coarse	3.50
Sand blast medium, fine	3.00
Fleetwood, Pa.—Furnace lining	**2.25**
Franklin, Pa.—Traction	2.25
Brass molding	2.50
Molding fine, steel molding	2.50
Molding coarse, fine, green	2.25
Sand blast	5.00
Core	2.50
Greenville, Ill.—Molding coarse red	1.75@2.25
Guion, Ark.—Molding fine	2.00@2.25
Roofing	3.00
Stone sawing	2.50
Hancock, Md.—Core and brass mldg.	1.65
Hellam, Pa.—Core	2.00@2.50
Joplin, Mo.—Stone sawing, flint	**1.25**
Kansas City, Mo.—Missouri River core	**.85**
Klondike and Gray Summit, Mo.—Molding fine	**2.00@2.50**
Lake Weir, Fla.—Sand blast	.60
Mapleton, Pa.—Core, furnace lining, molding fine and coarse damp	2.50
Core, furnace lining, molding, fine and coarse, dry	3.00
Massillon, O.—Molding fine	3.00
Molding coarse	3.00
Traction	3.00
Furnace lining	3.50
Core	3.00
Michigan City, Ind.—Core, bank	.75
Traction	.50
Millington, Ill.—Core and furnace	2.50
Core, washed	**1.50**
Mineral Ridge, O.—Core, molding, sand blast, roofing, etc., washed, screened (damp)	2.50
Montoursville, Pa.—Traction	1.50@2.00
Brass molding, fine	1.75@2.25
Ohio—Various points:	
Iron molding, fine	1.50@2.25
Iron molding, coarse	1.75
Brass molding, minimum	2.00
Oregon, Ill.—Core, furnace lining, molding fine, brass molding	2.50
Sand blast, molding coarse	3.50
Ottawa, Ill.—Sand blast	3.50
Furnace lin'g, mold'g fine and coarse	2.25
Core, roofing and stone sawing	2.00
Providence, R. I.—Molding fine	2.00
Molding coarse	1.90
Brass molding	2.25
Sand blast	3.00@4.00
Sugar Grove, Ohio—Core (dried)	2.00
Traction	2.60
Thayer, Pa., Traction	2.00
Furnace lining, molding, coarse	1.25
Molding, fine	1.50
Core, washed	2.50
Core, green	2.00
Tygarty, Ky.—Core and stone sawing	2.60
Fire-brick sand, washed but not dried	2.15@2.40
Utica, Pa.—Core	2.00
Molding coarse, traction	2.50
Brass molding	2.75
Sand blast	3.50
Warwick, Ohio—Core, furnace lining, molding fine and coarse (dry)	2.50@2.75
Core, furnace lining, molding fine and coarse (green)	2.25
Wedron, Ill.—Core, (crude silica)	.75@1.00
Molding fine, coarse	.75@1.00
West Albany, N. Y.—Molding fine	1.75@2.25
Molding coarse	1.50
Brass molding	1.75
Zanesville, Ohio — Molding fine and brass	2.00@2.50
Molding coarse	1.75@2.25

Gypsum, per Ton

Castalia, O.—Crushed, to cement mills	3.50
Ground, to cement mills	3.50
Land plaster	6.00
Bags extra—Jute, 3.00; ppr., 1.00.	
Fort Dodge, Ia., bulk	**3.50**
Garhutt, N. Y.—Land plaster, bags	7.50
Grand Rapids, Mich.—Crushed gypsum	4.50
Ground gypsum rock	9.00
Gypsumville, Man., Can. (crushed)	3.50
Oakfield, N. Y.	7.50
Sandusky, O.	6.00

Jute sacks, $3.00 extra; paper, $1.00 extra.

Ground Rock Phosphate

Centerville, Tenn.—B. P. L., 70%; ton, 2000 lbs. (90% thru 100 mesh)	10.00
Lump rock, 72% to 75%, B. P. L.	**6.00@8.50**
Centreville, Tenn.—B. P. L., 65%	8.25
B. P. L., 70%	9.00@9.50
Brown rock, 75% and better	12.00
Gordonsburg, Tenn.—2000 lbs. (90% thru 100 mesh)—B. P. L., 60%	**6.00**
B. P. L., 65%	**7.00**
B. P. L., 70%	**8.50**
B. P. L., 75%	**12.00**
Lump rock, long ton, 70%	9.00
Mt. Pleasant, Tenn.—(B. P. L. 68%)	
13% phosphorus	7.00
14% phosphorus	8.00
Mt. Pleasant, Tenn.—B. P. L., 70%	7.50@10.50
Nichols, Fla.—Pebble, B. P. L., 68%	**10.00**
Wales, Tenn. (95% thru 100 mesh) (guaranteed 14% phosphorus equiv.)	7.00@8.25
Walls, Tenn.—B. P. L., 70.2%—	
To County Agri. Assns.	**7.50**
To others	**7.75**

Florida Soft Phosphate

Croon, Fla.—Ground pebble, 30%	16.00
Pulverized soft, 26%	17.50
Jacksonville (Fla.) District	10.00@12.00
(Add 2.50 for sacks)	
Phoslime, Fla. (in burlap bags, 100-200 lbs.)	**15.00**

General News from Rock Products Markets

Constantly Increasing Use of Lime in Concrete Construction

THE VALUE OF LIME as an aid to concrete construction is being universally recognized by the foremost engineers throughout the country. In the following projects, which are either under way or decided upon, hydrated lime is specified.

KANSAS CITY, MISSOURI

Turkey Creek Sewer: Forty pounds hydrate per cubic yard in aboveground, and 60 pounds in underground work.

Goose Neck Sewer: Same proportions of hydrate. (Estimated cost $3,000,000.)

Blue Valley Sewer: Same proportions of hydrate. (Estimated cost $6,000,000.)

TULSA, OKLAHOMA

Hospital: To cost several million dollars. Hydrated lime specified in concrete foundation.

ARKANSAS CITY, ARKANSAS

Concrete Reservoir: Two million gallons capacity. Hydrated lime to be used.

The National Lime Association, Mather Bldg., Washington, D. C., announces that it will be glad to furnish detailed information regarding the way in which lime makes best construction.

Tennessee Happenings in the Rock Products Industry

MEMPHIS, Tenn.—Operators in this market report cement as scarce as in other sections; transportation and interruption of manufacturing account for this. Demand is good and despite a very rainy season, building activity is good.

In the gravel and sand business local dealers are now getting deliveries all right. The high water has interfered at some points but the waters after reaching a very high level are beginning to recede.

No changes are reported in lime trade; demand good, supply fair and prices as at recently quoted levels.

The Wolf River Sand Co., on Front St., Memphis, has made extensive improvements at their local yards to facilitate in delivering sand.

Fischer Lime and Cement Co., Memphis, has the site cleared and work in progress for their new warehouse addition on Walnut St., north of the present structure. The new building will cost upwards of $175,000. It will have two floors and a basement. The construction will be reinforced concrete throughout. It will be finished on the outside with terra cotta tile. The large increase in their business made the additional warehouse necessary though they now have a very handsome place erected a few years ago. Kaucher, Hodges and Co. are the contractors. Plans have been completed by Architect E. L. Harrison. A freight elevator will be installed, the roof of the new building will be of felt and pitch, with top coat of gravel. W. W. Fischer is president of the company, Wm. N. Fry, vice-president; F. R. Thomas, secretary, and E. Hatfield, treasurer.

A. J. Cook, of the A. J. Cook Lime and Cement Co. was elected one of the new directors of the Memphis Retail Credit Association.

Richard Hardy, of the Dixie Portland Cement Co., of Chattanooga, delivered an address before the Chattanooga Manufacturers Association, at Hotel Patten, Chattanooga, recently, on the subject "Business and Politics." He recounted some of his observations in the East and made the suggestion that it behooved business men to take a greater interest in statecraft.

Open-Top Cars for Automobiles?

THE INTERSTATE COMMERCE COMMISSION has recently issued orders to the railway terminal commissions not to load open-top cars except with the commodities they were designed for. Don't jump to the conclusion that this means all gondola cars are designed for coal hauling. They are not. But obviously gondola cars were never designed for carrying automobiles, and it is partly because so many now are being used for this purpose that an acute shortage exists for handling mineral aggregates. Whenever you see a specific instance of this misuse of your equipment, register your protest.

A "Green" Stone in Demand

THE MAKERS of artificial roofing find a strong demand for greens. Crushed green slate has been used, but is not bright enough and soon deteriorates. Epidote rock has recently been used, but owing to the toughness of the original rock, and the included impurities, the most objectionable of which are sulphides, it is not entirely satisfactory. The mill that has been grinding and sizing epidote rock for the trade at South Mountain, Pa., has been burned, and will not likely be rebuilt. The olivine rocks of North Carolina are about to be examined for their suitability for this purpose.—S. H. Hamilton, in the "Engineering and Mining Journal."

Attractive Booklets on Hydrated Lime

FOUR NEW BOOKLETS are now available for distribution by the Construction Department of the National Lime Association. They are:

No. 350—Economical Brick Motor
No. 351—In the Concrete Chute
No. 352—Permanently Dry Basements
No. 353—Hydrated Lime in Concrete (Practical Pointers and Proper Methods).

These booklets are pocket-size (3½x 6-in.) so that they will go in an ordinary size letter envelope. They contain pithy and attractively printed data on the constructional uses of hydrated lime. With their advent the National Lime Association gives increasing evidence of a new lease of life and usefulness.

Two Agronomists Appointed in the Eastern Bureau of the National Lime Association

TWO AGRONOMISTS have recently been appointed to the field staff of the Eastern Bureau of the National Lime Association. R. C. Parker, formerly county agent in Suffolk County, Long Island, will cover New England and Eastern New York with headquarters probably at Springfield, Massachusetts. Mr. Parker was born on a farm at Spencerfort, in western New York, and graduated in agriculture at Cornell University in 1917. He has been in farm bureau work continuously since graduation, first, as an assistant in Clinton County, New York, and later as organizer and manager of the farm bureau in Suffolk County. In this latter region he has had contact particularly with the large vegetable-producing interests of that region. He has shown active interest in problems of crop production and soil improvement. There is a strong relationship between the soil conditions of Long Island and of all the territory that Mr. Parker will cover in his new work.

J. S. Owens, formerly extension agronomist at State College, Pennsylvania, will have as his particular field territory eastern Pennsylvania, New Jersey, Delaware and Maryland. Mr. Owen was born on a farm in Clearfield County, Pennsylvania, and graduated in agriculture at State College, Pennsylvania, in 1913. Since that time his experience has been with that institution; first, in connection with the soil fertility and crop experimental work, and later in extension work in the same field. He therefore has secured the investigative viewpoint on which is superimposed a fairly wide range of field observation of soil and crop problems in that state.

General News from Rock Products Markets

Kansas Cement Cases Still in Court

EFFORTS TO COMPEL Kansas cement producers to submit their books and correspondence to examination and to answer 189 questions, were made recently by the attorney-general of Kansas. The motions were filed in connection with ouster suits against a number of cement companies instituted several months ago for alleged violations of the state anti-trust laws. None of the cases have yet been brought to trial by the attorney-general.

In the motions presented to the state supreme court, the attorney-general's office submitted a bulky document containing 189 interrogations. Each of the defendant companies is asked to answer the questions. In the meantime the court is urged to grant to the attorney general the right to examine the books, correspondence and records of the various companies.

The ouster suit against the cement companies is based on charges that the various producers entered in an agreement or combination in restraint of trade for the purpose of controlling prices. The petition which was filed last fall, asks for receivers for the companies, enforcement of fines and issuance of an order removing the various companies from doing business in Kansas.

Meeting of the Talc and Soapstone Producers' Association

A MEETING OF THE TALC AND SOAPSTONE PRODUCERS' ASSOCIATION was held in New York, April 15. A large percentage of the talc producing capacity of the country was represented and much important business was transacted. The Committee on Permanent Organization reported and the constitution was formally approved and adopted.

C. J. Stover, of the Secretarial Service, Philadelphia, Pa., gave a brief talk upon the subject of "Open-Price Associations," which was followed by a general discussion of the subject. The subject of research for the purpose of developing new uses for talc and expanding present uses was discussed at length. The association decided to raise the sum of $2,000 by subscription in order to get under way some form of research work; a large part of this sum was immediately subscribed or guaranteed. The expenditure of this money was left in the hands of the Executive Committee. This action is very encouraging as it indicates a lively interest, among talc producers, in benefiting their industry through systematic technical research.—Raymond B. Ladoo, in U. S. Bureau of Mines, Reports of Investigations.

Shippers' Rate Hearings Postponed

THE Interstate Commerce Commission has ordered an adjournment to June 7 of the hearings for an advance in freight rates. Up to the time of adjournment only the railway side of the case had been presented. So there is still time for you to help the National Associations in the Mineral Aggregate Industry to present their case. June 17 is the date set by the Commission to hear the Mineral Aggregate Industries' representatives. Have you done your part? If you haven't, dig up before it is too late.

Oregon County to Sell Its Convict-Made Crushed Stone

PRODUCTION OF CRUSHED STONE by prison labor is common in many parts of the country, but usually the material is used for force-account county and state road work. Multnomah County, Oregon, however, has just entered into a contract to furnish a Portland paving contractor with 5,000 cu. yds. of crushed stone.

According to the terms of the contract the contractor will pay the county $1.75 a cu. yd. for 3-in. crushed rock, and $2 a cu. yd. for screenings. According to the county sheriff the prison quarry should show results on the profit side of the ledger if $1.50 a cu. yd. is secured for rock crushed.

The Unfortunate Quarry Man Again!

WASHINGTON, D. C.—Severe restrictions upon the movement of quarry and stone products from New England may result from a hearing held by the Federal Horticultural Board on May 7. The rapid spread throughout the New England States of the gipsy and brown-tail moth, it is declared, have made necessary the formulation of quarantine orders to prevent their spread to other States. The proposed regulations will prohibit the shipment, from the affected area to other parts of the country, of practically all field, quarry and forest products.

Reports to the Agricultural Department show that during the summer of 1919, in addition to the territory already under quarantine, the insects were found in 46 towns in Maine, 45 in New Hampshire, 23 in Vermont, 14 in Massachusetts and three in Connecticut.

Contract Prices for Filter Sand

COLUMBUS, OHIO.—Contracts have been let for quantities of sand and gravel required for renewing present water-works filtration beds and construction of additional ones at the city filtration plant. The Concrete Material Co., Columbus, is to provide 150 cu. yd. of sand at 70 cents per ton. The Ohio & Michigan Sand & Gravel Co. has the contract for 460 cu. yd. of gravel at $4.10 a ton.

Need of Uniform Lime Inspection Law

WEST VIRGINIA is actively preparing a lime inspection law which will come before the next meeting of the state legislature. The State of Indiana has also been considering the enactment of such a law. Federal data indicate that lime from one state is often shipped to more than a dozen other states. Last year New York shipped its product into 21 states and Canada, Ohio into 33 states, Missouri into 30, and Pennsylvania into 25. All these facts indicate, with emphasis, the importance of having uniform laws and regulations covering the inspection of such materials as lime and fertilizers.—Bulletin of the National Lime Association.

Hats Off to Secy. Sandles as a Promoter!

WHATEVER OPINIONS one may have as to the relative merits of agricultural lime and agricultural limestone, he will have to hand a bouquet to Secretary A. P. Sandles, of the National Agricultural Limestone Association, as a past-master of repartee. Witness the following:

NO DEBATE ON AGSTONE

It Is Safety First

Macadam Service has received a printed circular under title of "Does Burnt Lime Destroy Organic Matter."

There is a vigorous debate on this question among soil chemists and experts. Will burnt or caustic lime destroy the humus or plant food power of the soil.

While folks are getting red in the face debating and printing circulars on this question we know one thing for sure. *There is no such debate on Agstone. It is God's natural remedy for sick and sour soil. The more the better. It cannot do any possible harm.*

Agstone is one of the world's greatest crop boosters. It makes clover grow and farmers crow. Agstone never did and never will ruin the crop-producing value of any soil. There is no debate on Agstone. It's safety first.

Passed By The Screens

Incorporations

Talc Development Co., Ltd., Montreal, Que., has been incorporated with a capital of $75,000.

Foam Lake Cement Block, Brick & Tile Co., Ltd., Foam Lake, Sask., has been incorporated with a capital of $20,000.

The **Lufkin Rock Co.**, Lufkin, Tex., has been incorporated for $12,000 by W. M. Glenn, E. L. Kurth and L. M. Mitchell.

The **Pueblo Lime and Quarrying Co.**, Colorado Springs, Colo., has been incorporated for $150,000 by J. C. Teller and others.

The **Diatomite Products Co.**, Los Angeles, Calif., has been incorporated to produce and sell diatomaceous earth products.

The **Vermont Marble Co.**, incorporated under the laws of Vermont, has obtained a license in Ontario permitting it to use a capital of $150,000.

The **Palacios Shell Co.**, Palacios, Tex., has increased its capital from $50,000 to $75,000 in order to increase its facilities for producing mud-shell.

The **C. E. Willmering Sand and Gravel Co.**, Amarillo, Tex., has been incorporated for $30,000 by C. E. Willmering, G. T. Grove and E. T. Miller.

The **Diamond Sand and Gravel Co.**, Cleveland, Ohio, has increased its capitalization from $10,000 to $50,000 to finance improvements and enlargement.

The **Sandusky Limeston Quarries Co.**, Cleveland, Ohio, has been incorporated for $1,500 by C. A. Pierson, M. A. Smith, B. C. Heller, B. Clark White and E. F. Marcha.

The **Spruce, Pine, Sand and Gravel Co.**, Wilmington, Del., has been incorporated for $200,000. The incorporators are M. L. Horty, M. C. Kelley, S. L. Mackey, all of Wilmington.

The **Muskoka Quarries, Ltd.**, Toronto, Ont., has been incorporated with a capital of $300,000 to open up quarries of stone or deposits of sand, gravel or clay by W. B. Tait, David Coleman, G. Bailey and others.

The **Greeley-Donohue Sand Co.**, Cleveland, Ohio, has been incorporated for $10,000. The incorporated for $10,000. The incorporators are P. J. Greeley, E. H. Donohue, J. F. Curry, J. M. Murray and W. J. Hart.

Lynch, McKee & Co., Syracuse, N. Y., has been incorporated for $50,000 to produce sand, gravel and mineral products generally. The incorporators are O. E. Lynch, W. G. McKee and C. H. Searl, all of Syracuse.

The **Niles Sand and Gravel Co.**, Charles City, Iowa, has been incorporated to operate sand and gravel plants with a capital of $300,000. The incorporators are E. R. Ernsberger, M. W. Ellis, W. B. Johnson, of Charles City.

The **Dakota Concrete Stone Co.**, Sioux Falls, S. D., has been incorporated for $100,000 to deal in building materials and to operate quarries. The incorporators are Stanley H. Edmunds, J. B. Wildberger and A. L. Edmunds, all of Sioux Falls, S. D.

The **Tarbox-McCall Stone Co.**, of Findlay, Ohio, has been incorporated with a capital of $60,000 to manufacture crushed stone for road building and building purposes. The incorporators are H. L. Tarbox, Essie Tarbox, J. A. McCall, L. A. McCall and F. P. Blackford.

The **Beloit Limestone Co.**, Beloit, Wis., has been incorporated for $10,000 to produce and manufacture crushed stone and agricultural limestone. The incorporators are W. L. Townsend, R. H. Townsend, C. T. Samp, and the attorneys are Woolsey & Arnold, 318 Goodwin Block, Beloit, Wis.

The **Grafton Sand and Gravel Co.**, Grafton, Wis., has been incorporated for $25,000 to quarry limestone, sand and gravel, and also to do a general contracting business. E. T. Wright, Hattie N. Wright and L. W. Dilweg are the incorporators. The attorneys are Geisenfeld & Geisenfeld, Cawker Bldg., Milwaukee, Wis.

The **Farmington Cement Products Co.**, Farmington, Minn., has been incorporated to produce and deal in sand, gravel, crushed stone, etc., and to do construction work. The capital stock is $25,000. The officers are F. J. Miller, president; L. W. Rentfrow, vice-president, and Dr. J. A. Sanford, secretary-treasurer, all of Farmington.

AMERICAN CEMENT PLASTER CO. SOLD TO BEAVER BOARD

ACCORDING to information obtained in Chicago as Rock Products goes to press, the American Cement Plaster Co., prominent gypsum plaster and wall-board manufacturer of Lawrence, Kan., has been sold to the Beaver Board Cos. of America, Buffalo, N. Y. This means a recognition of gypsum wall-board by the world's largest manufacturer of wood pulp wall-board and brings into the gypsum industry one of the financially strongest building-material manufacturers in the world. Further details will be published in a later issue.

The **Cross Fertilizer Co., Ltd.**, Sydney, N. S., is making phosphate from rock phosphate.

The **Concrete Brick Co., Ltd.**, Windsor, Ont., has been incorporated with a capital of $40,000.

The **Consolidated Sand & Supply Co., Ltd.**, Montreal, Ont., has been incorporated with a capital of $1,000,000 to deal in sand, rock, stone, etc.

The **Bates Bros. Seam-Face Granite Co.**, Quincy, Mass., has been incorporated for $15,000. The directors are G. B. Bates, president; Russell T. Bates, Quincy, treasurer, and E. S. Bates.

Quarries

The **Oklahoma Engineering Co.**, Miami, Okla., is in the market for equipment for a new crushed stone plant of a capacity from 250 to 500 tons per day.

The **Oglesby Granite Co.**, Elberton, Ga., producers of "Blue Oglesby Granite," is planning the installation of a crushing plant to have a capacity of about 500 tons per day. This company is a famous monument producer but has found the demand for crushed stone so insistent that it will probably soon go into that end of the stone business too. H. L. Wiggs is president.

The **Lakeshore Stone Co.**, Milwaukee, Wis., is dismantling its Belgium, Wis., plant. The No. 9 Gates crusher at this plant was the first of its size ever built. It has been in service nearly 20 years and will be moved to the company's Lannon plant and re-erected. The Belgium plant which is being dismantled and the quarry abandoned was one of the largest and most complete rock crushing plants of its day. It was described in "Engineering News" at the time of its completion and was considered a model plant.

The **Brunner-Mond Co.**, one of the largest industries in Western Ontario, producers of soda ash, have under advisement the enlargement of the Amherstburg plant. The Brunner-Mond is a branch of the Solvay Process Co. of America, and built a $4,000,000 plant at Amherstburg, having completed the same about a year ago. The completion of the installation of their machinery made it possible for the plant to turn out a large supply and now the enlargement to take care of Canada's growing needs is under consideration.

The **City of Fort Madison, Iowa**, is negotiating for the purchase of a stone quarry located in Hancock county from Al Bertschi, prominent farmer. The rock deposit which the city intends to purchase is located on a tract of land a half acre in size and fronting the river. It is the present plan, if the deal goes through, to have rock quarried by city workmen and brought to this city on barges. The rock, which is said to be of fine quality, will be used in repairing the river front of the city which suffered so severely in a recent storm on Lake Cooper. The fact that rock can be brought from the prospective quarry site on barges and unloaded directly at the point on the river front which members of the council wish to repair will effect a considerable saving, it is thought, as stone brought from any other quarry will have to be loaded on cars for shipment and then unloaded here and carried to the river in wagons.

The **Great Western Sugar Co.**, home office Denver, Colo., is reported to be opening a new limestone quarry at Pringle, S. D., to supply its lime kilns.

The O. C. Barber Allied Industries Co., Canton, Ohio, are reported to have ceased the production of agricultural limestone. S. L. Briggle, formerly sales manager of this department, is now with the agricultural limestone department of the Michigan Limestone and Chemical Co., of Buffalo, N. Y.

The **Erie Limestone Co.**, New Castle, Penn., has purchased the Abner Gibson farm at West Pittsburgh, Penn., for $21,000. The company owns 800 acres of limestone quarry land adjacent to this farm. It is reported that the company will begin operations on the new property as soon as the railway conditions permit.

The **Greenville Rock and Sand Co.**, Greenville, S. C., is developing an excellent sandstone quarry on Piney Mountain near Greenville. It is reported that the rock is of a superior quality for building purposes. The company has its own battery of trucks and teams. Shipments to out of town points will be made by rail, when required. The company starts out with a capacity of five cars a day, which will be increased as the trade demands. Every character of crushed stone, building stone, curbing, screened and washed sand in three grades—concrete, builders, placters—will be available. L. A. Boggs, general manager, is a recognized authority on quarry products and sand, having had long years of experience in this field. One feature of the new company's policy is the arrangement to deliver by fast trucks supplies of material to city jobbers where storage space is limited and where speedy delivery of small quantities are required to keep the work of the contractors moving. The company's truck equipment embraces vehicles of capacity from one-half to five tons, and the horse-drawn vehicles are of every character required for light and heavy work. The officers of the company are: L. A. Boggs, president and general manager; H. C. Mims, vice-president, and J. Y. Wallace, secretary and treasurer. The officers of the new company are located at the Manufacturers Warehouse and Storage Company on River street, Greenville.

Personals

Frank G. Conkling, who for the past five years has been the northeastern manager for the Atlas Portland Cement Co., in Boston, has been transferred to Birmingham, Ala. He will be the southern manager for the Atlas Company.

Joseph H. Beck, traffic director of the St. Paul Association, St. Paul, Minn., has been appointed executive secretary of the National Industrial Traffic League, Chicago, Ill., vice Guy M. Freer, deceased. He assumed his new duties June 1.

George Hayes Limb, of the Victor Electric Plaster Mills, North Melbourne, Victoria, Australia, was a recent visitor at the office of Rock Products. He is visiting gypsum plants in this country and purchasing equipment for his company.

Clifton Slusser, of Akron, Ohio, has been made general superintendent of the new plant, now under construction, of the Goodyear Tire and Rubber Co. of California, at Los Angeles. Mr. Slusser was born in Massillon, Ohio, and left school at the age of 11 to start work as a glass blower. Since then he has been machinists helper, plumber, rubber worker and assistant to the Goodyear factory manager at Akron, Paul W. Litchfield. Deprived of the chance of a complete education, he studied in night school, donned overalls in the day time and went through every Goodyear factory department.

OBITUARY

James Brodie, president of Brodies Limited, Montreal, Que., who operate granite quarries, is dead.

John Bonis, manager of the Thames Stone Quarry Co., St. Mary's, Ont., was instantly killed at the quarry on May 28. He was adjusting the friction gear of the tilting table which holds the stone car when it reaches the top of the quarry preparatory to its load of stone being dumped into the stone crusher. The operator of the tilting table, not knowing of Mr. Bonis being nearby, tilted the car of stone, with the result that Mr. Bonis' head was caught between two braces and crushed, death being instantaneous. He was in his 51st year.

ROCK PRODUCTS
542 So. Dearborn St., Chicago, Ill.

Date.....1920

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☐ Glass Sand ☐ Cement
☐ Lime ☐ Plaster

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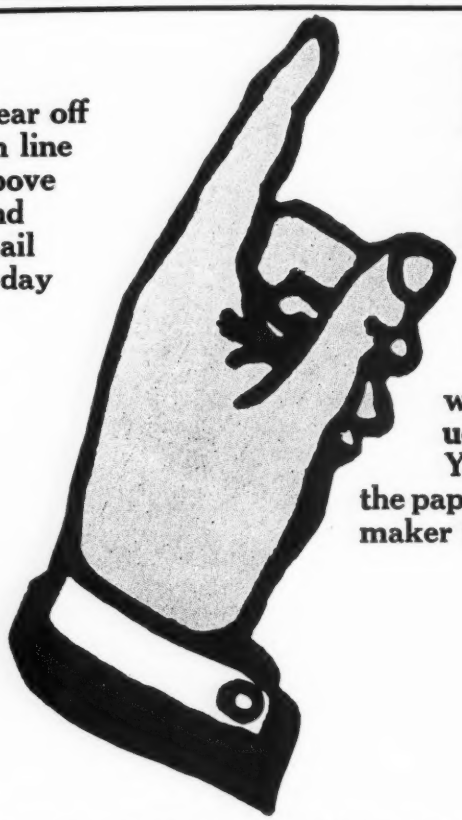

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Here is a blank for your convenience in subscribing to what several thousand producers have endorsed as "the world's best business paper of the rock products industry." You have read this number. You know that ROCK PRODUCTS is just the paper you have been looking for. It is a money-maker for those who use its services.

Every one of its big issues—and there are 26 of them each year—is packed full of ideas and information that will help you to operate your business with less trouble and with greater profit.

Ideas—this world couldn't progress without them. You have them—so do the other fellows.

ROCK PRODUCTS gathers together a wealth of ideas that have worked out—describes them in detail—tells what they consist of and how others have cashed in on them.

Information—the greatest amount obtainable relating to plant operation. How "this" and "that" is done. Short cuts to increase productions—How labor conditions are dealt with. Everything you need to know concerning the machinery and equipment that is proving most successful in handling all sorts of operations.

Problems—ROCK PRODUCTS is helping you to fight your battles connected with freight rates, car shortage and similar conditions. A paper for the executive and the superintendent. A practical guide to all operators in this industry.

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If you are already a subscriber, why not do a service for a friend by calling his attention to

ROCK PRODUCTS

CLASSIFIED ADVERTISING

Rates for advertising in the Classified Department: $2.50 per column inch per insertion. Minimum charge, $2.50. Please send check with your order. These ads must be paid in advance of insertion.

Plants For Sale | Plants For Sale | Plants for Sale

FOR SALE

Bruce Mines Trap Rock Plant

Located at Bruce Mines, Ontario, harbor, on the northern shore of Georgian Bay.

Consisting of a modern crushing, storage and loading plant, having a crushing capacity of three hundred tons per hour.

Unlimited supply of high-grade Trap Rock, the best known material for roads and concrete construction, because of its exceptional hardness, toughness, cementing and fire-resisting qualities.

Cheap transportation to all Great Lakes and nearby territory.

Plant all ready and equipped for immediate operation.

An exceptional opportunity to obtain a plant and equipment at a fraction of its replacement value. Address

W. S. Edward, Saulte Ste. Marie, Michigan, or Perry E. Wurst, 291 Elm St., Buffalo, N.Y.

Plants for Sale

Live Material Business For Sale

We offer for sale our building material business, including stock in trade, accounts, equipment, good-will, etc., situated in an Illinois town of about 30,000 population and having an industrial payroll of about $30,000,000 a year. Our sales run a quarter of a million a year. Get in touch with us at once. Address

Box 1405 Care of Rock Products

FOR SALE LIMESTONE QUARRY

No. 7½ and No. 5 Gyratory Crushers and complete equipment. High calcium stone. Plant located in central Ohio on N. Y. C. R. R.

F. J. Colgan, Columbus, Ohio

Help Wanted

WANTED

Mechanic to keep up crushing machinery at trap rock quarry. Must be thoroughly familiar with Gates crushers and not afraid of hard work. Permanent position for good man. Advise age, experience and salary expected. Address

Big Rock Stone & Construction Co.

111 Center Street, Little Rock, Arkansas

WANTED

Superintendent capable of taking complete charge of large stone crushing plant equipped with modern machinery throughout. Necessary that applicant be good organizer and be fully experienced. Address

Box 1406 Care of Rock Products

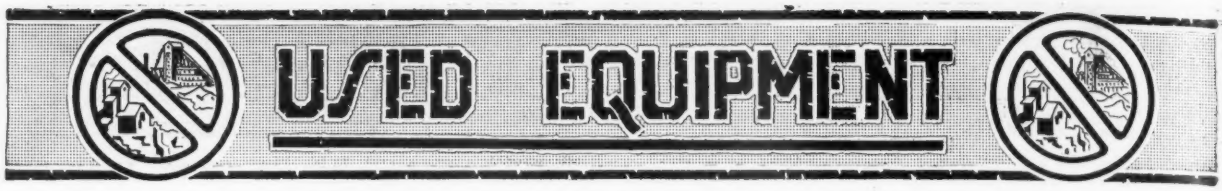
Miscellaneous

WANTED

Responsible parties to erect and operate a hydrated and agricultural lime producing plant on my property at Bronson, Michigan, formerly owned by the Bronson Portland Cement Company, located on N. Y. C. R. R. 200 acres fine marl land with commodious steel and cement buildings with large storage capacity already built. Also sidetrack on property connecting with main line of R. R., office buildings, dredges, etc. Location, two miles from city. Main Lincoln Cement Highway ¼ mile from plant. Desire to furnish marl, buildings and equipment on hand on royalty basis. Plant surrounded by finest agricultural lands in Michigan and Indiana. Large demand for products. Capital required, $150,000.00 to $200,000.00.

F. M. RUDD

Bronson, Michigan



Rates for advertising in the Used Equipment Department: $2.50 per column inch per insertion. Minimum charge, $2.50. Please send check with your order. These ads must be paid in advance of insertion.

Repaired Contractors' Equipment

Steam Shovels

Model 60 Marion Shovels, 2½-yard dippers, Nos. 1999, 2059

1—Model 70 Marion, 2½-yd. dipper, Shop No. 2693.

1—Model O Thew, ½-yard dipper, full revolving, on traction wheels.

Hoisting Engines

1—8½ x 10 DC 2-D Lambert, with boiler

1—6 x 10″ DC 2-D Byers.

1—6¼ x 10 DC 2-D Mundy, with attached swinger and boiler

Cableway

1—Lidgerwood Cableway, 1164-ft. span, with 9 x 10″ DC Reversible Link Motion Cableway Engine, 3-ton capacity

We have a large stock of thoroughly repaired Construction Equipment of all kinds ready for immediate shipment.

Locomotives

1—14 x 20″ standard gauge saddle tank Locomotive.

2—American 10 x 16″ Locomotives, 36″ gauge, with butt joint boilers

4—18-ton 10 x 16″ Dinkeys, 36″ gauge

Clam Shell Buckets

1—1½-yard Browning.

Cars

20—12-yard Western Air Dump, standard gauge, 26 ft. bed.

H. KLEINHANS COMPANY

Union Arcade **Pittsburgh, Pa.**

FOR SALE

SAND AND GRAVEL PUMPING OUTFIT, complete, consisting of one 10″ Morris Pump, direct connected to double 9x9 engines. One Scotch Marine boiler 11′6″x 11′6″, about 200 H.P., allowed 150 lbs. One Bartlett & Snow Crane, 50′ steel boom, 1 yd. bucket.

M. A. CALLAHAN
THE SAND MAN
Schofield Bldg. **Cleveland, Ohio**

FOR SALE

1—Gates No. 5 type "K" Gyratory Crusher, standard back drive, extra new pinion, chilled iron fitted, excellent condition. Also all sizes Jaw and Gyratory Crushers, all types, capacities Pulverizers.

J. F. DONAHOO CO.
BIRMINGHAM, ALABAMA

For Sale

74 tons of 30-lb. rail,

16 tons of 20-lb. rail,

1—36-in. gauge dinky, Porter,

5—4-yard steel dump cars,

1—20-ton truck scale, Howe.

All transmission equipment for screening plant operating 12 "Gilbert" screens and one 14-ft. horizontal screen, including all shafting pulleys, clutches, rope drive and clutch, sprockets, link belts, etc., complete. Material in Minneapolis.

F. M. HENRY
514 Lumber Exchange, Minneapolis

WANTED

One full revolving clam-shell crane and shovel combined, on caterpillar traction, gasoline power. Suitable for one-half or three-quarter yd. clam-shell and one, or one and a quarter, shovel bucket. Twenty-five or thirty ft. boom. Also, one jaw crusher with 28x36 or 36x42 inch opening. To crush to not smaller than eight in. size. Address

SCIOTO LIME & STONE CO., Delaware, Ohio

FOR SALE

Sturtevant Ring Roll Mill (pulverizer).
Thew O type ⅝ yd. Shovel.
Locomotive Crane, 8 wheel st. gauge.
Byers Auto Crane, Model C, ⅜ yd. clam.
Stiff Leg Derrick and 1 yd. clam.
Keystone Excavator.
Bucyrus 2½ yd. Shovel.
125 H. P. Fire Box Boiler.
No. 2 Gates Gyratory Crusher.
25 K. W. D. C. Generator.
20 ton Shay Locomotive, st. gauge.
40 ton Climax Locomotive, st. gauge.
Holt Caterpillar Tractor.
16 Koppel 24-in. Gage Dump Cars.
Austin Caterpillar Mixer.
Rollers, 3 wheel (Austin and Case).

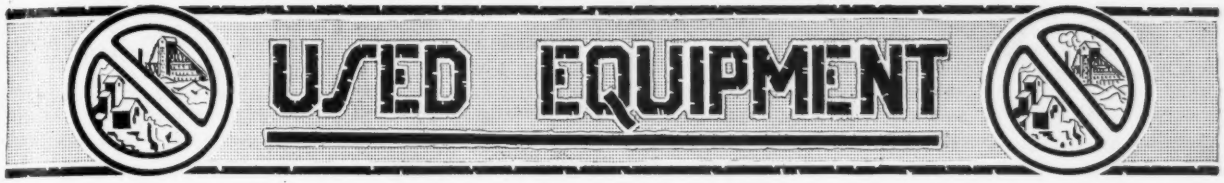
I own the above and can ship at once. Prefer cash, but will consider terms.

D. B. Straley, Crown Point, Ind.

Formulas, Books

CONCRETE MEN—Send one dollar for my guaranteed formulas and instructions on concrete, artificial stone, marbles, floors, tiles, sinks, washtubs, etc. Twenty-five years' experience.

N. P. Dubuc, Jr., Cement Expert
Box 9, New Bedford, Mass.



STONE CRUSHERS

Offered for prompt inspection and shipment—

Two CHALMERS & WILLIAMS No. 6 Gyratory Crushers. Both standard rear drive. Have two arm spiders and suspended shafts. Smooth concaves, corrugated heads, of chilled iron. One never used, the other has seen but light service and shows no wear. Located in New Jersey.

We have many others—Gyratory Type from size No. 2 to No. 9. Jaw Type from 8x14 in. to 30x60 in. Also several Symons Disc Machines, Crushing Rolls, Pulverizers, etc.

Try us also for LOCOMOTIVE CRANES, STEAM SHOVELS, LOCOMOTIVES, CARS, RAILS, HOISTING ENGINES, DERRICKS, GRAB BUCKETS, AIR COMPRESSORS, CABLEWAYS, ETC.

Wm. B. Grimshaw Co., 1048 Drexel Bldg., Phila., Pa.

Dealers in USED but NOT ABUSED Machinery

Immediate Delivery

4—No. 6 GATES CRUSHERS

Reg. drive, nickel steel shaft, fine condition. extra manganese mantle, West. shipment.
1—No. 8 Gates reg. drive, Ohio ship.
20—Crushers, Nos. 2 to 10, mostly Gates.
9—150 H.P. 125 lb. H.R.T. Boilers, butt strap.
2—48″x12′ Taylor Manganese Screens.
25—Air Compressors, 60 to 4,000 cu. ft.
1—9x8 Ingersoll-Rand steam.
1—427 cu. ft. Chicago pneumatic steam.
1—2400 ft. Sullivan two stage, also 3000 ft.
1—95 H. P. Loco. type boiler, Illinois ship.
75—Steam and centrifugal pumps.
1—30-60 H.P. Emerson-Brantingham tractor. $1600.
1—No. 4 CRUSHING PLANT (A.C. motor drive). Concrete mixers—contractors' equipment.
3000 ft. Trac. Cable, ⅝″ Roebling.

Send us your inquiries for electrical equipment, pavers, engines, hoists, etc.

Ross Power Equipment Co., Indianapolis Indiana

New—RAILS—Relaying

All sections on hand for quick shipment. Reasonable prices quoted. Our stock is very complete.

M. K. FRANK
Frick Building Pittsburgh, Pa.

Hyman Michaels Co.

People's Gas Building
CHICAGO, ILL.

New and Relaying Rails

Iron and Steel Scrap

Write or wire us when in the market to buy or sell

New York Pittsburgh St. Louis

Machinery For Sale

DRYERS—Direct-heat rotary dryers, 3x25 ft., 3½x25 ft., 4x30 ft., 5x35 ft., 5½x50 ft., 6x50 ft. and 7½x60 ft.; double shell dryers, 4x20 ft., 5x30 ft. and 6x35 ft.; steam-heated air rotary dryers, 4x30 ft. and 6x30 ft.

KILNS—Rotary kilns, 8x60 ft., 6x60 ft., 3½x25 ft. and 3x25 ft.

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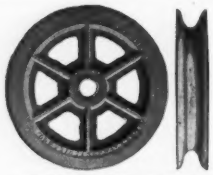

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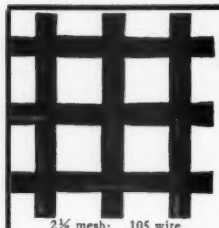

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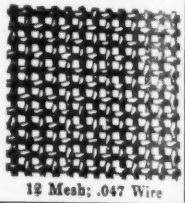

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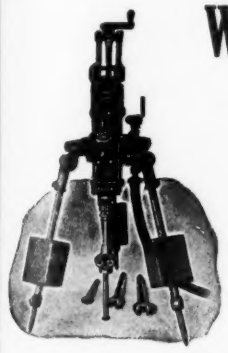

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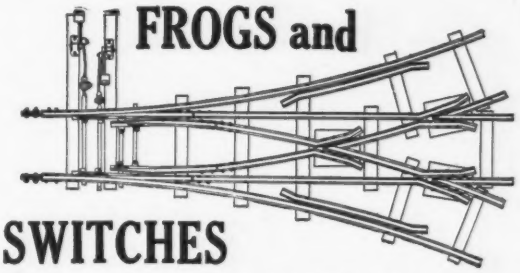

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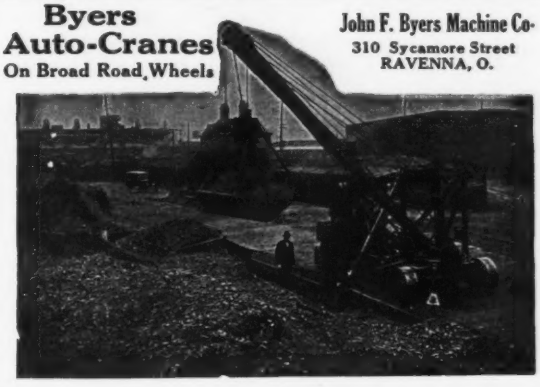

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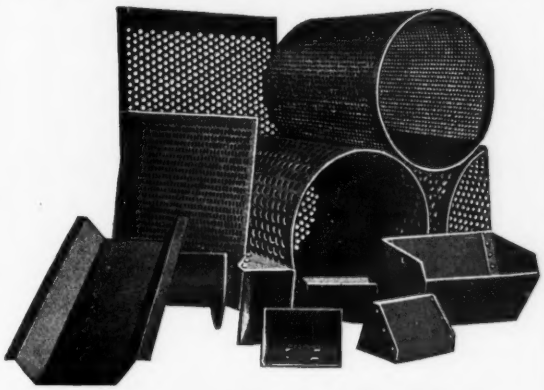

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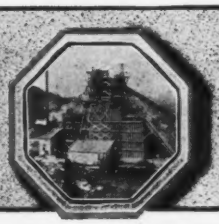

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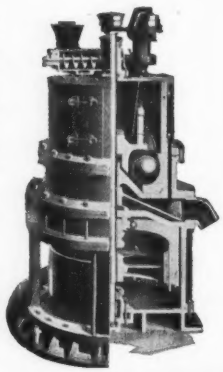

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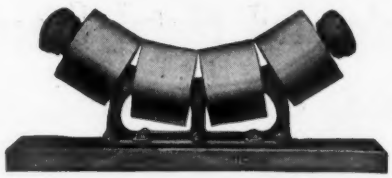

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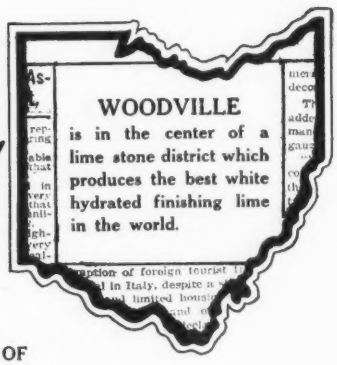

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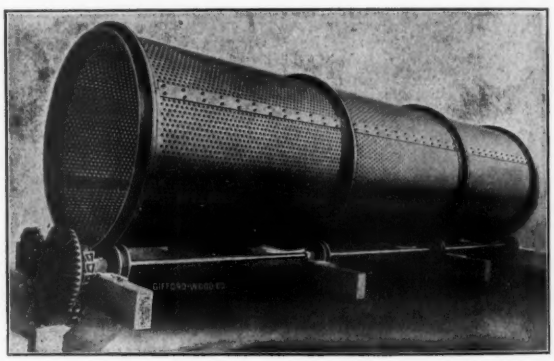

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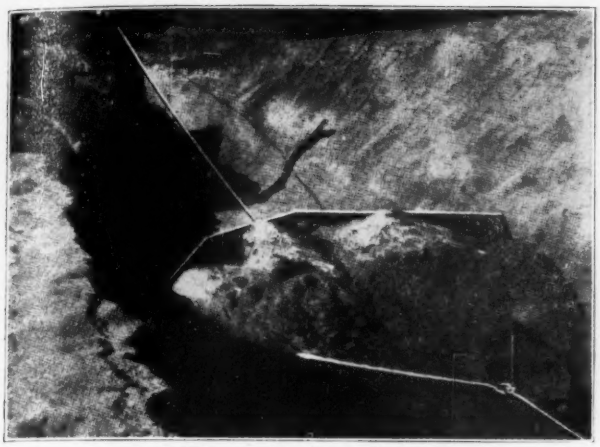

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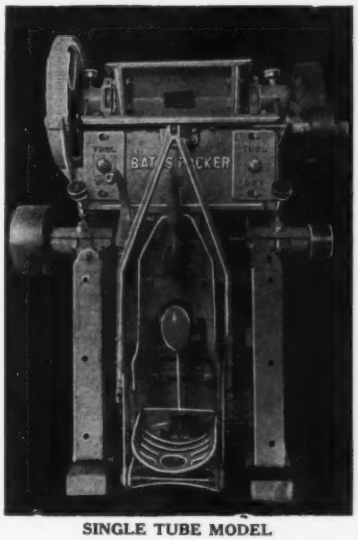

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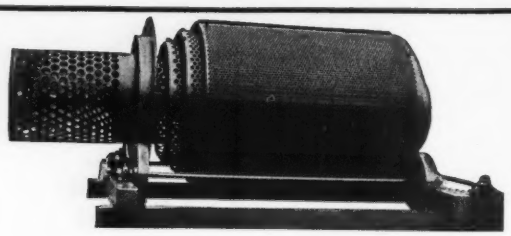

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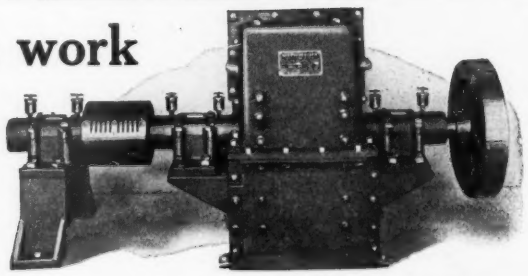

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GEAR AND FRICTION DRIVEN GASOLINE LOCOMOTIVES—2½ TO 25 TONS ON DRIVE WHEEL

WHITCOMB LOCOMOTIVES

IT WILL PAY YOU TO GET OUR PROPOSITION BEFORE YOU BUY

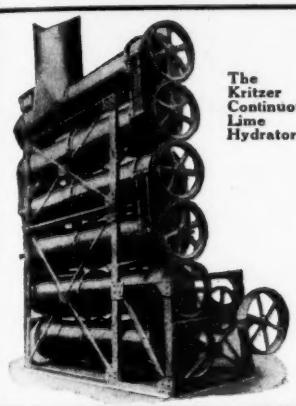
GEO. D. WHITCOMB CO.

MAIN OFFICE AND WORKS

ROCHELLE, ILLINOIS

U. S. A.

STORAGE BATTERY LOCOMOTIVES—1 TO 8 TONS ON DRIVE WHEELS



The Kritzer Continuous Lime Hydrator

Hydrating Lime

97% of Hydrated Lime is made either by the Old or by the New Kritzer Process. We Guarantee to manufacture the Best Product at the Lowest Possible Cost. Our engineers have worked out every practical improvement in use today in hydrating lime.

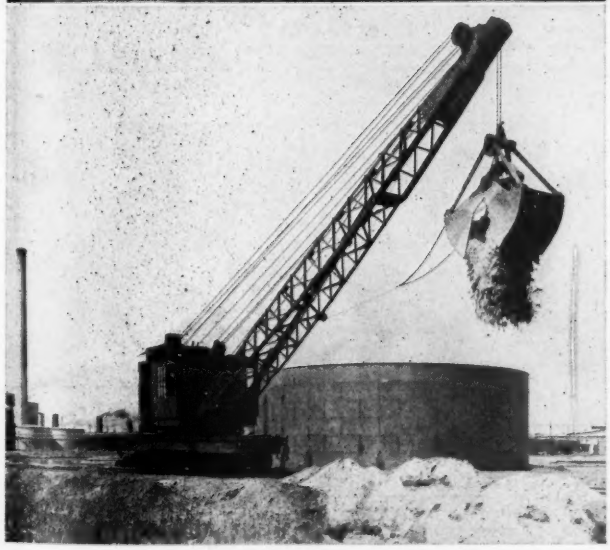
It is our business to solve your problems.
It is our business to investigate thoroughly the conditions that prevail at every plant, to work out all the details and to build a plant that will prove a success from the start.

We assume the Responsibility. Now is the time for you to act. Take the matter up with us NOW and we will outline your whole proposition for you.

THE KRITZER COMPANY

503 South Jefferson Street CHICAGO, ILL.

LOCOMOTIVE CRANES
CLAM SHELL BUCKETS - SHIPBUILDING CRANES
CAR DUMPERS PILE DRIVERS
THE McMYLER INTERSTATE CO.
CLEVELAND OHIO



A CRANE WITH A RECORD FOR SPEED

A McMyler Interstate Type "B" Crane, equipped with a McMyler Interstate Clam-Shell Bucket, made a record of 13 trips in 3 minutes, swinging at 90° each trip. The speed is important, but the fact that the crane will stand up under continuous service such as this is more important. The first cost of a crane is of little importance if a large percentage of return is insured. Greater speed, consequent greater capacity, together with low maintenance cost, make the Type "B" one of the best "buys" on the market.

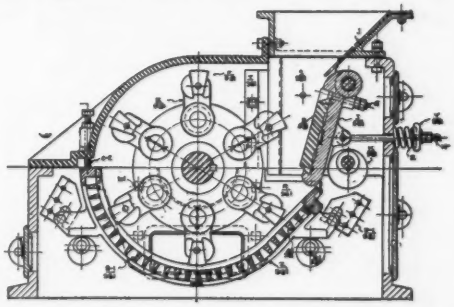
The McMyler Interstate Co., Cleveland, O.

BRANCH OFFICES:

New York—1756 Hudson Terminal Bldg. Seattle ——— Hoge Bldg.
San Francisco—Merchants Exchange Bldg. Denver ——— 18th and Wazee Streets
Chicago ——— 812 Edison Bldg.

THE KENNEDY

Swing-Hammer Pulverizer



A Mechanically Perfect Device

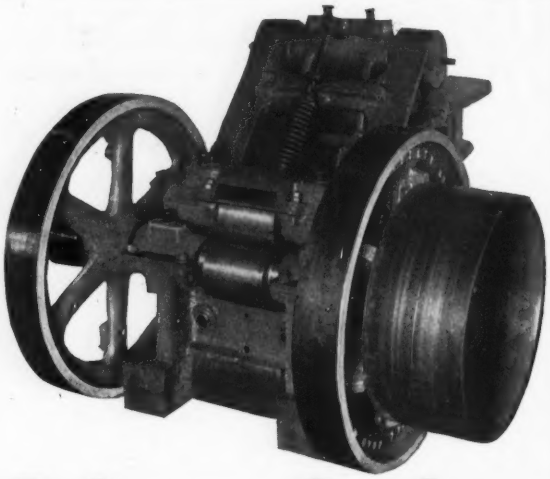
The Kennedy Swing-Hammer Pulverizer embodies mechanical improvements heretofore considered unattainable. Reversible, renewable hammer tips and breaker plates of alloy steel. Impact pulverizing—no grinding movement. Adjustable steel grid—so controlled as to permit adjustment while machine is running. Automatic lubrication. Ball and socket bearings—in short, every possible improvement tending toward efficiency, durability and low maintenance expense.

Send for full description

Kennedy Van Saun Mfg. & Eng. Corp.

"Vickers, Ltd., Vickers House, Westminster, London, England, licensed manufacturers for Great Britain and colonies."

120 Broadway New York



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IN ALL SIZES FOR EITHER PORTABLE PLANTS FOR ROAD BUILDING OR STATIONARY QUARRY INSTALLATIONS.

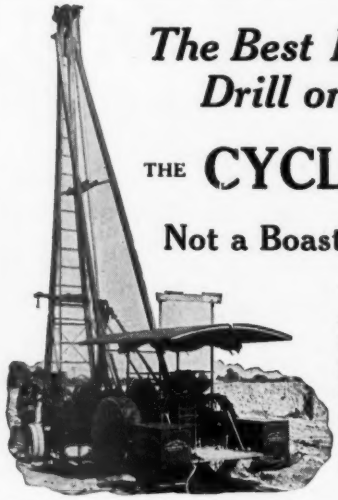
BUILT FOR LONG, HARD SERVICE—WILL SAVE YOU MONEY IN THE LONG RUN

Let us quote you prices

Universal Road Machinery Co., Kingston, N. Y.

Branches in all principal cities in U. S. and Canada

MANUFACTURERS OF THE FAMOUS RELIANCE LINE OF ROAD BUILDING AND QUARRY EQUIPMENT



The Best Blast-Hole Drill on Earth

THE **CYCLONE** No. 14

Not a Boast—A FACT

We will prove the superiority of the No. 14 Drill by placing one of the outfits in your quarry against any or all other makes.

If the Cyclone doesn't out-drill and out-wear all other drills, we will remove it from the work without cost to you.

Our proposition gets below the paint—it eliminates talking points and evaporates hot air. It puts buying on a strictly engineering basis where it belongs.

Furnished in Steam, Gasoline, Compressed Air or Electric Power Traction or Non-Traction

Let us send you full particulars

The Sanderson-Cyclone Drill Co.

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Eastern and Export Office 1778 Broadway, New York

A Highly Efficient Building Material Handler

It's a 20-Ton, 8-Wheel

OHIO CRANE

Serving a Concrete Mixer

Owner, Arthur McMullen, New York City

Outstanding characteristics of the Ohio Crane are: Simplicity of design—few parts—cut steel gears—bronze interchangeable bearings—all parts strong and large—ease and speed of operation.

Ask Us to Show You an Ohio at Work

OHIO LOCOMOTIVE CRANE CO.

Poplar Street - - BUCYRUS, OHIO

NATIONAL Screen Separator

The Leading Screen in

Efficiency

Durability

Simplicity

Capacity

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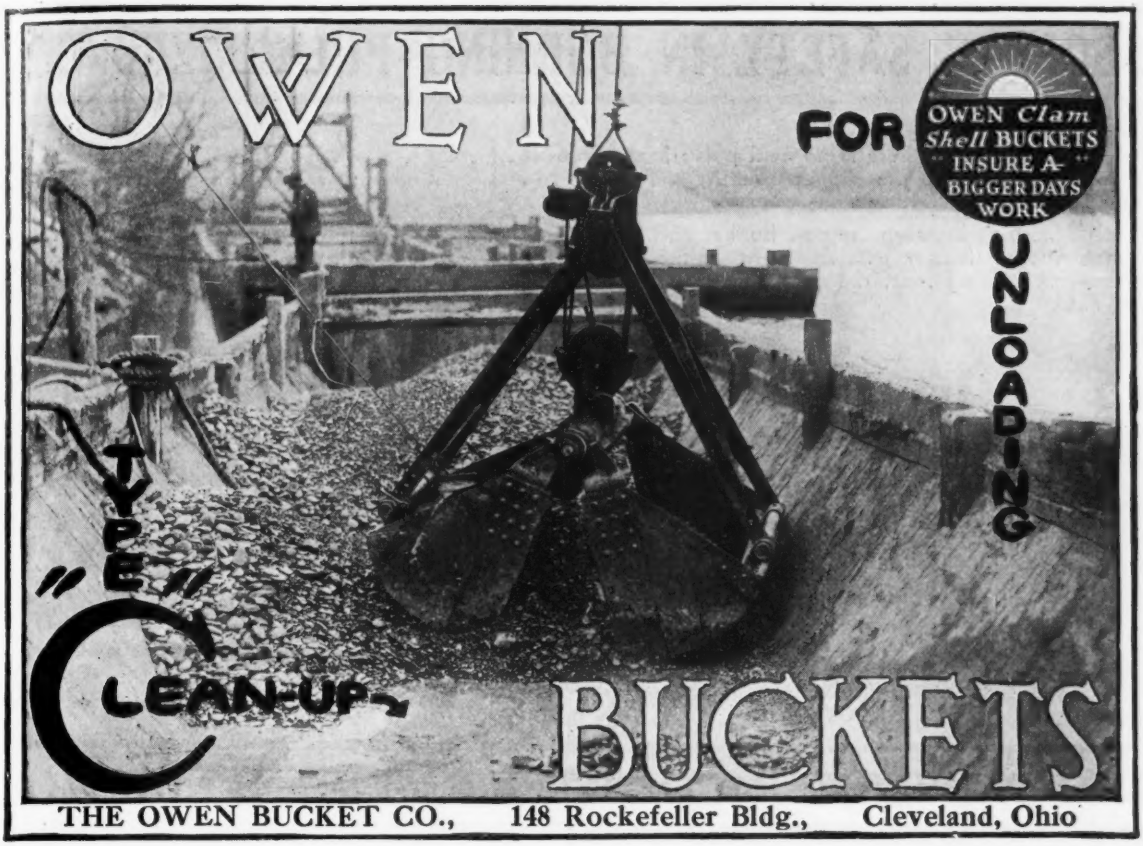
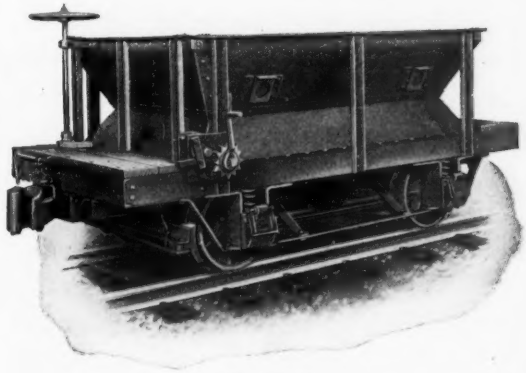


THE OWEN BUCKET CO., 148 Rockefeller Bldg., Cleveland, Ohio



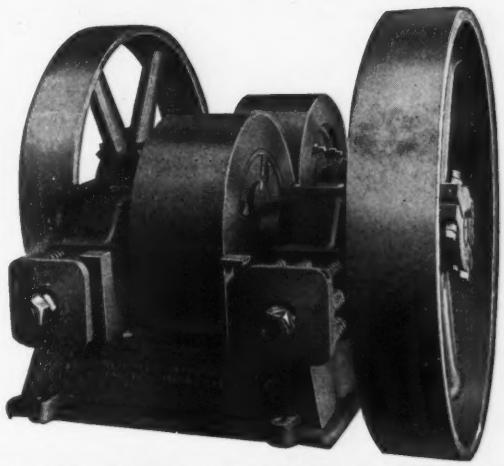
No. 138-R

WATT CARS

We have devoted years to the study of cars for your requirements, and now offer free our engineers' expert judgment in solving your problems.

CARS—every type—that's all we make.

The Watt Mining Car Wheel Co.
Barnesville, Ohio



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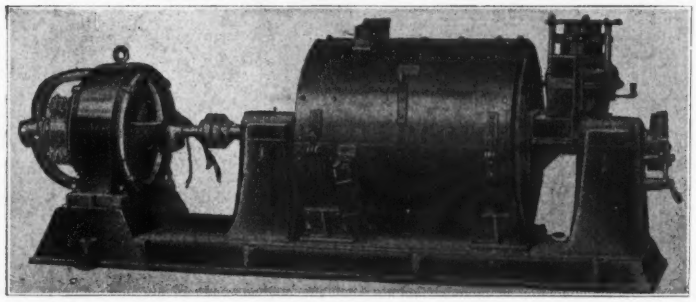
WEBB CITY, MISSOURI

ABSOLUTE SAFETY IN BURNING PULVERIZED COAL

By the Aero System there is no coal pulverized except for instant use. As conditions call for the supply so does the Aero produce the proper quantity. The hazard attendant upon storage of the coal powder is entirely eliminated.

There is nothing between the coal bunker and the furnace except the Aero, its motor and a plain pipe connection. Another feature with the Aero—if the coal supply is sheltered from rain and snow no artificial drying is necessary. Neither must the coal be of a very high grade—low cost slack coal can be made to yield its last B. T. U.

The AERO PULVERIZER



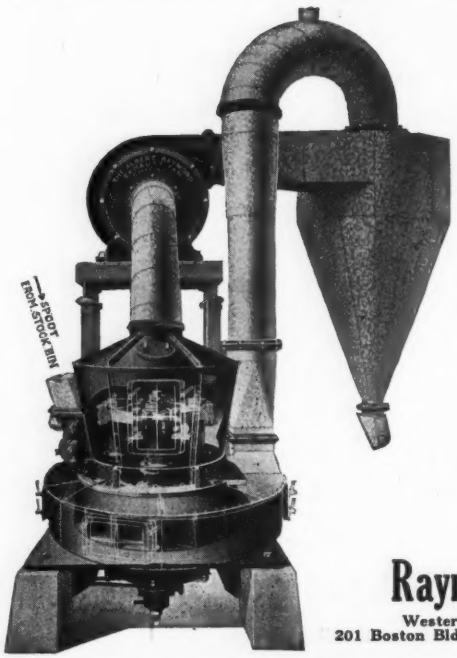
is designed as a complete unit for one furnace. They are built in five standard sizes ranging in capacity from 600 lbs. to 5,000 lbs. of coal per hour. Dust-proof and strongly built. All parts susceptible to wear are easy of access.

BACKED BY THE LONGEST SUCCESSFUL SERVICE

Write for Bulletin

AERO PULVERIZER CO., 120 BROADWAY, NEW YORK

If by installing Raymond Air Separating Equipment in your grinding department you can save the labor of one man and make that part of your plant clean and dustless for the remainder of your employees, don't you think it will be worth an investigation?



Raymond Equipment will do this and more because it is a clean and dustless operating unit which will grind your materials as fine as you want them without using screens, bolting reels or other auxiliary machinery,

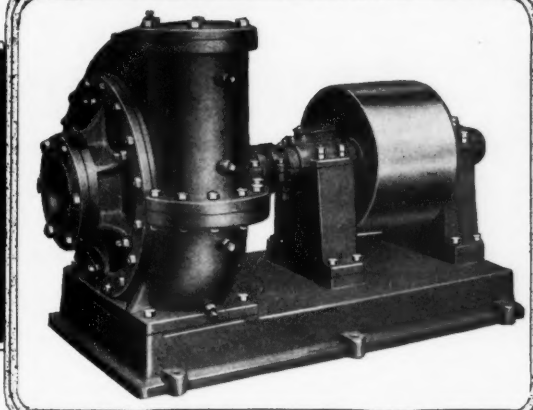
Consider the advantages of one complete unit to take your material around one inch size and reduce all of it to the required fineness, delivering this finished product direct to a storage bin, and we think you will see the advantage to you of full information as to what we can do.

Our business is not only one of manufacturing Pulverizing Machinery, but principally of rendering expert service for the economical reduction of materials to a powder.

Raymond Bros. Impact Pulverizer Company

Western Office:
201 Boston Bldg., Denver, Colo.

1301 North Branch St., Chicago, Ill.

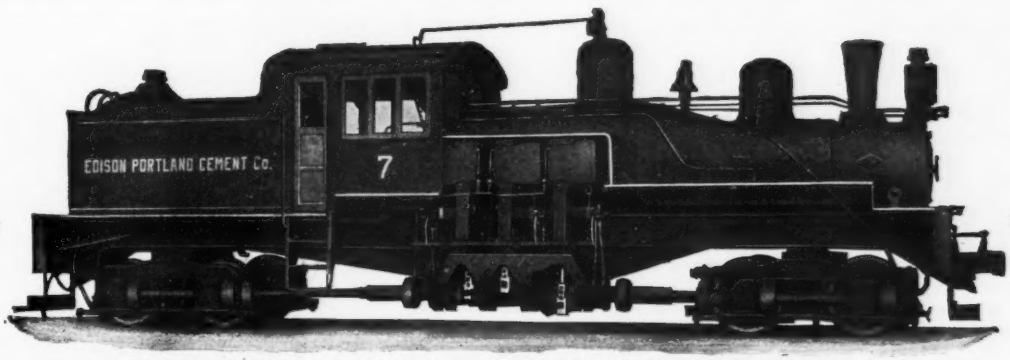


MORRIS PUMPS

We have been marketing manganese steel pumps for many years through our branch office at Johannesburg, S. Africa, where they are used for handling tailings and slimes in connection with the gold recovery cyanide plants. In the Morris pump a solid manganese liner fits inside the cast iron shell, and when worn it takes but a couple of hours to disconnect the pipe line, lift off the top half of the pump and take out the shell liner. The suction disc liner can be replaced independent of the shell liner, and the impeller can be taken out through the disc opening. This ease of interchangeability makes the Morris stand alone as an economical proposition.

Let us tell you all about our line.

MORRIS MACHINE WORKS
BALDWINSVILLE, NEW YORK



60-TON SHAY ENGINE BUILT BY LIMA FOR EDISON PORTLAND CEMENT CO.

More Work in Less Time

Shay locomotives do more work in less time than rod engines.

They start instantly, without the need of "taking slack."

They spot cars accurately because of their multi-cylinder engines and gear drive.

They pull with an even, steady pull like that of an electric motor—avoiding damage to equipment.

Shays mean increased production.

LIMA LOCOMOTIVE WORKS, Inc.
LIMA, OHIO **30 Church St., New York**

NOW COMES THE

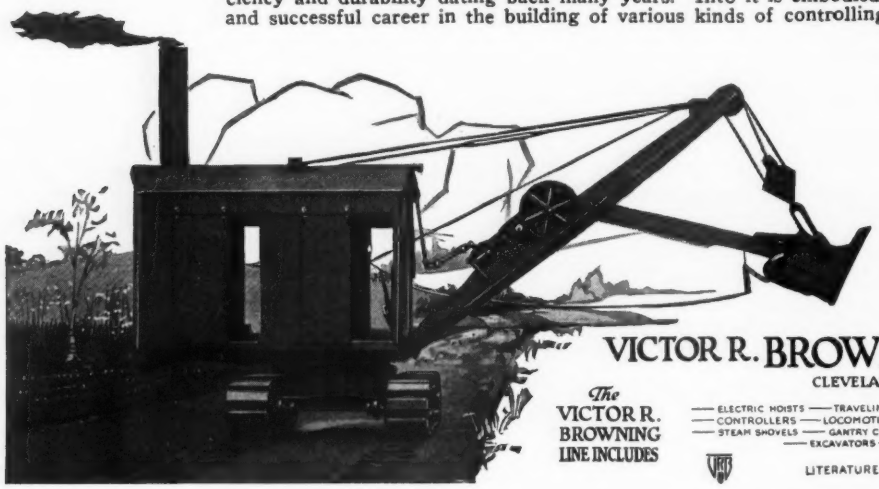
Tank Crawler VRB Steam Shovel

VRB Steam Shovels are now available, mounted on an improved tank crawler truck.

In the war, tanks proved their utility beyond a shadow of doubt.

Likewise, the VRB tank crawler has demonstrated its fitness to operate in places and under soil conditions that would put an ordinary steam shovel entirely out of commission.

As regards the power plant and control mechanism, this shovel holds a reputation for uncommon efficiency and durability dating back many years. Into it is embodied the knowledge gained from a long and successful career in the building of various kinds of controlling and material handling machinery.



VRB Shovels are manufactured for either steam or electric operation in 7½ and 10-ton sizes, and dipper capacities of ¾ to 1 yard.

Copies of the new steam shovel bulletin will be sent to all interested, and those having unusual excavating or material handling problems are invited to avail themselves of the advisory service of our engineering department.

Your attention is called to the complete VRB line as mentioned below, and the ease with which you can obtain bulletins on any subject of interest.

VICTOR R. BROWNING & COMPANY
CLEVELAND, OHIO

The VICTOR R. BROWNING LINE INCLUDES

— ELECTRIC HOISTS — TRAVELING CRANES — MILL TYPE MOTORS
— CONTROLLERS — LOCOMOTIVE CRANES — CLAM SHELL BUCKETS
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— EXCAVATORS — BUCKET TROLLEYS

LITERATURE WILL BE SENT

CHECK ITEMS OF INTEREST WRITE NAME ON MARGIN AND MAIL

Increase Your Production

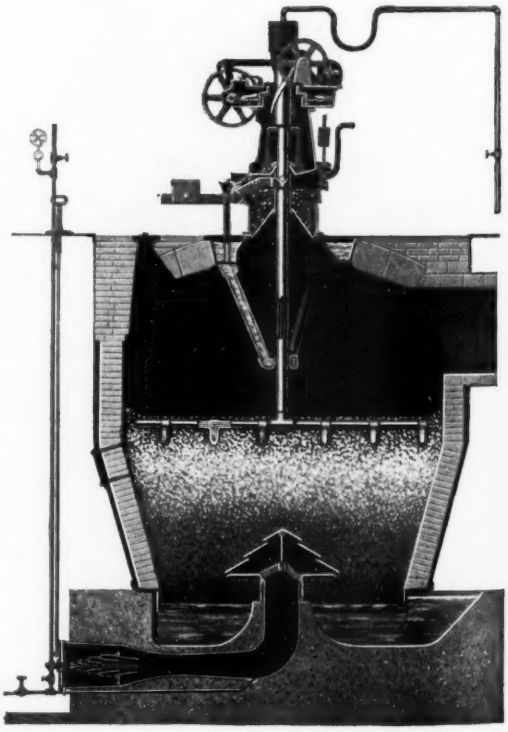
of high grade lime by heating your kilns with producer gas generated in

CHAPMAN Agitator Producers

They deliver a constant supply of high quality gas, thus insuring a uniform temperature in the kiln. This uniform supply of high quality gas burns with a long, clear flame which resembles the flame from a wood fire. The result is a greater production of first grade lime.

The Chapman Floating Agitator will increase the capacity and the efficiency of hand-poked producers already in operation.

Write us for special information



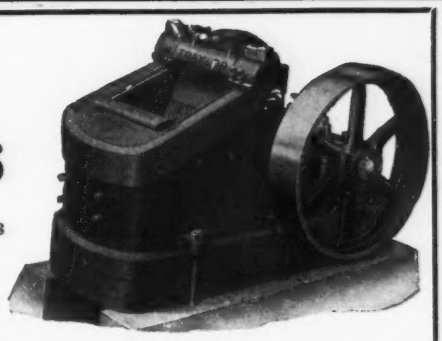
The Chapman Engineering Company

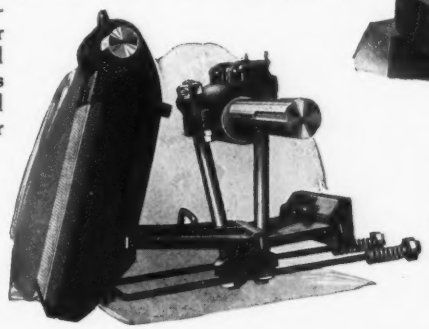
Oliver Bldg. Pittsburgh — MT. VERNON, OHIO — 11 Broadway New York

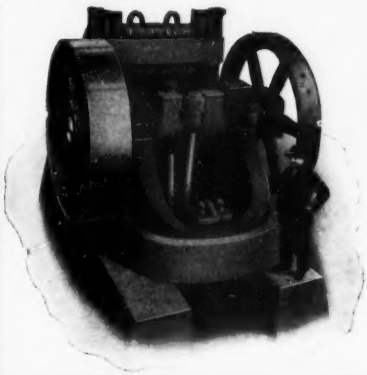
The "Inside Facts" of

Traylor "Bulldog" Jaw Crushers

The lighter but far stronger pitman and the frictionless toggle system represent a tremendous advance in jaw crusher design; 80 per cent of the usual friction load is eliminated by this feature alone—a saving that will effect big economies in your crushing.







Bulletin RJX-1

fully describes the many "Bulldog" economies.

Write for your copy.

Traylor Engineering & Mfg. Co.

ALLENTOWN, PA.

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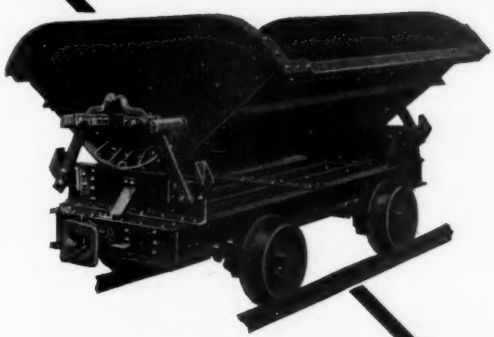
"By George! Those Cars Do Last!"

Many users comment on the staying qualities of Koppel Cars, and the fact that they are always in shape to do the work. The secret is in their correctness of design and the care used in their construction.

TRADE MARK REGISTERED KOPPEL U. S. PATENT OFFICE

Koppel Quarry Cars



The illustration shows a special double-side steel dump car with a capacity of two cubit yards. Has extraordinary strength and dumps at a 39 degree angle, allowing free clearance. It is especially adaptable for quarries, limestone and brick plants.

Koppel Industrial Car & Equipment Co.

Koppel, Pa.

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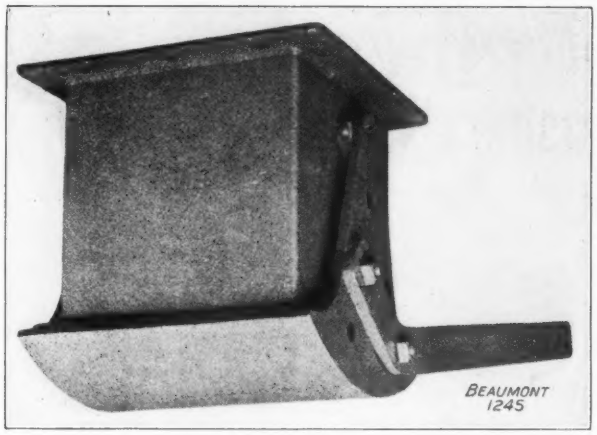

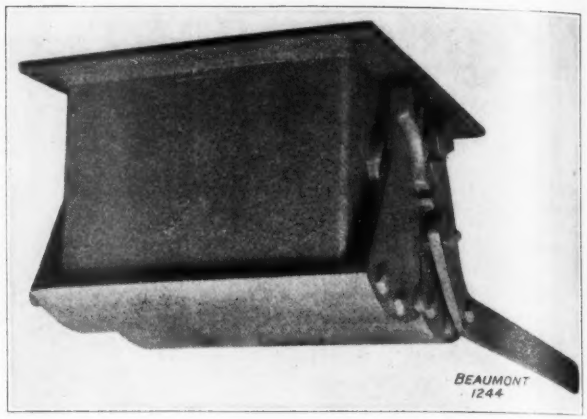

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The Clyde Lime Hydrator Performance Counts

The Clyde was first in the field, and through dependable and economical performance is still first choice of lime operators.

The Clyde Hydrator produces big capacities of lime at only three-fifths the cost of any other hydrator on the market.

The Clyde not only produces over 90% of the hydrate of America, but makes the best quality of finishing lime from either high calcium or magnesium.

Simple, easiest to operate, and most economical in cost of installing, maintaining and operating.

Send for Catalog

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Patentee and Sole Manufacturer

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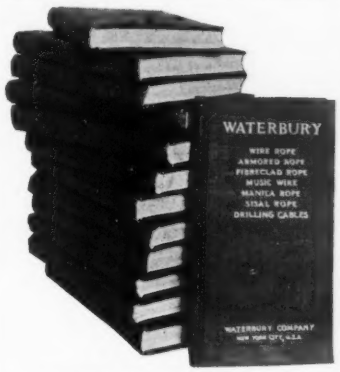
Waterbury Wire Rope of iron, crucible cast steel, extra crucible cast steel and improved plow steel is made in all lays and standard sizes. Let us help you to select the right rope for your work, so that satisfactory service will be doubly sure. Waterbury quality in every grade is without a superior.



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WATERBURY COMPANY
63 PARK ROW, NEW YORK

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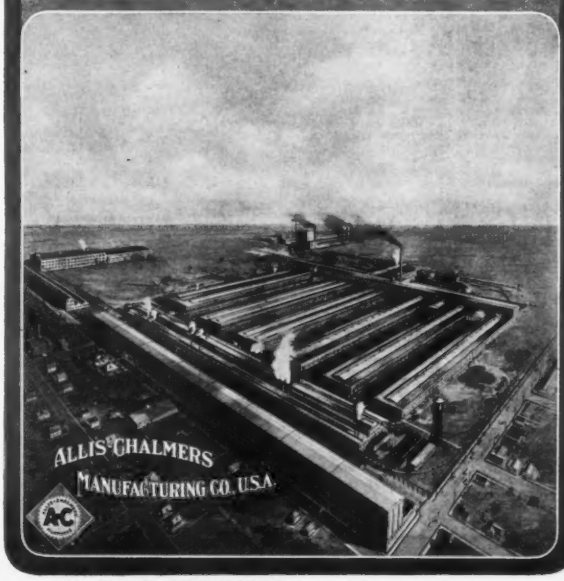
The scope of the Allis - Chalmers business is realized by a glance at the list of principal products—equipment of highest merit for every engineering and industrial requirement.

ALLIS-CHALMERS
MILWAUKEE, WIS. U.S.A.



Buyers' Guide of the Rock Products Industry

Classified Directory of Advertisers in Rock Products

AIR COMPRESSORS
Worthington Pump & Mach. Co., New York City.

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Bates Valve Bag Co., Chicago, Ill.
Jaite Company, The, Jaite, Ohio.
Valve Bag Co. of America, Toledo, Ohio.

BELTING
Cincinnati Rubber Mfg. Co., Cincinnati, Ohio.
Hettrick Mfg. Co., Toledo, Ohio.
Main Belting Co., Philadelphia, Pa.
New York Belting & Packing Co., New York City.
U. S. Rubber Co., New York City.

BELT FASTENERS
Crescent Belt Fastener Co., New York City.

BELT LACING
Crescent Belt Fastener Co., New York City.

BELT RIVETS
Crescent Belt Fastener Co., New York City.

BIN GATES
Beaumont Mfg. Co., Philadelphia, Pa.

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Weller Mfg. Co., Chicago, Ill.

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Atlas Powder Co., Philadelphia, Pa.
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BUCKETS, ELEVATOR
Hendrick Mfg. Co., Carbondale, Pa.
Stephens-Adamson Mfg. Co., Aurora, Ill.

BUCKETS
Advance Eng. Co., Cleveland, O.
Browning Co., Cleveland, Ohio.
Marion Steam Shovel Co., Marion, Ohio.
McMyler Interstate Co., Cleveland, Ohio.
Owen Bucket Co., Cleveland, Ohio.

CALCINING MACHINERY
Atlas Car & Mfg. Co., Cleveland, Ohio.
Butterworth & Lowe, Grand Rapids, Mich.

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U. S. Chain & Forging Co., Pittsburgh, Pa.

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Jeffrey Mfg. Co., The, Columbus, Ohio.
Link Belt Co., Chicago, Ill.
Portable Machinery Co., Passaic, N. J.
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Smith Eng. Works, Milwaukee, Wis.
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Sturtevant Mill Co., Boston, Mass.
Universal Road Mach. Co., Kingston, N. Y.
Webster Mfg. Co., Tiffin, Ohio.
Weller Mfg. Co., Chicago, Ill.

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American Hoist & Derrick Co., St. Paul, Minn.
Advance Eng. Co., Cleveland, O.
Ball Engine Co., Erie, Pa.
Browning Co., Cleveland, Ohio.
Byers Mach. Co., John F., Ravenna, Ohio
Chisholm-Moore Mfg. Co., Cleveland, Ohio.
McMyler-Interstate Co., Cleveland, Ohio.
Link-Belt Co., Chicago, Ill.
Ohio Locomotive Crane Co., Bucyrus, Ohio.
Osgood Co., The, Marion, Ohio.

CRUSHERS AND PULVERIZERS
Allis-Chalmers Mfg. Co., Milwaukee, Wis.
American Pulverizer Co., St. Louis, Mo.
Austin Mfg. Co., Chicago, Ill.
Bacon, Earle C., Inc., New York City.
Beaumont Mfg. Co., Philadelphia, Pa.
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Bradley Pulverizer Co., Allentown, Pa.
Butterworth & Lowe, Grand Rapids, Mich.
Chalmers & Williams, Chicago Heights, Ill.
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Good Roads Mach. Co., Philadelphia, Pa.
Gruendler Pat. Crusher & Pulv. Co., St. Louis, Mo.
Jeffrey Mfg. Co., The, Columbus, Ohio.
K. B. Pulverizer Co., New York City.
Kennedy-Van Saun Mfg. & Eng. Corp., New York City.
Kent Mill Co., Brooklyn, N. Y.
Lewistown Fdry. & Mach. Co., Lewistown, Pa.
McLanahan-Stone Mach. Co., Hollidaysburg, Pa.
Pennsylvania Crusher Co., Philadelphia, Pa.
Raymond Bros. Impact Pulverizer Co., Chicago, Ill.
Smidth & Co., F. L., New York City.
Smith Eng. Works, Milwaukee, Wis.
Sturtevant Mill Co., Boston, Mass.
Traylor Eng. & Mfg. Co., Allentown, Pa.
Universal Crusher Co., Cedar Rapids, Iowa.
Universal Road Mach. Co., Kingston, N. Y.
Webb City & Carterville F. & M. Works, Webb City, Mo.
Williams Pat. Crush. & Pulv. Co., Chicago, Ill.
Worthington Pump & Mach. Corp., New York City

DERRICKS
American Hoist & Derrick Co., St. Paul, Minn.

DRILLS
American Well Works, Aurora, Ill.
Sanderson Cyclone Drill Co., Orrville, Ohio.
Wood Drill Works, Paterson, N. J.

DRYERS
American Process Co., New York City.
Ruggles-Coles Eng. Co., N. Y. City.
Vulcan Iron Works, Wilkes-Barre, Pa.

DYNAMITE
Aetna Explosives Co., New York City.
Atlas Powder Co., Philadelphia, Pa.
Du Pont de Nemours & Co., E. I., Wilmington Del.

ENGINES, OIL & GAS
Worthington Pump & Mach. Co., New York City.

ENGINES, STEAM
Morris Mach. Works, Baldwinsville, N. Y.

ENGINEERS
Arnold & Weigel, Woodville, Ohio.
Bacon, Earle C., Inc., New York City.
Bradley Pulv. Co., Allentown, Pa.
Buckbee Co., J. C., Chicago, Ill.
Fuller Engineering Co., Allentown, Pa.
R. W. Hunt & Co., Chicago, Ill.
McAuliffe, P. J., N. Y. City
Smidth & Co., F. L., New York City.
Schaffer Eng. & Equip. Co., Pittsburgh, Pa.
Yates, Preston K., New York City.

EXCAVATORS
Ball Engine Co., Erie, Pa.
Green, L. P., Chicago, Ill.
Marion Steam Shovel Co., Marion, Ind.
Owen Bucket Co., Cleveland, Ohio.

EXCAVATORS
Dragline Cableway
Sauerman Bros., Chicago, Ill.

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Aetna Explosives Co., New York City.
Atlas Powder Co., Philadelphia, Pa.
DuPont de Nemours & Co., E. I., Wilmington, Del.
Grasselli Chemical Co., Cleveland, Ohio.

FUSES
Ensign-Bickford Co., Simsbury, Conn.

GAS PRODUCERS
Chapman Eng. Co., Mt. Vernon, Ohio.
International Clay Mach. Co., Dayton, Ohio.

GEARS
Caldwell, H. W., & Sons Co., Chicago, Ill.
Stephens-Adamson Mfg. Co., Aurora, Ill.

GLASS SAND EQUIPMENT
Lewistown Fdy. & Mach. Co., Lewistown, Pa.

HOISTS
American Hoist & Derrick Co., St. Paul, Minn.
Chisholm-Moore Mfg. Co., Cleveland, Ohio.
Vulcan Iron Works, Wilkes-Barre, Pa.

HOSE
Water, Steam, Air Drill, Pneumatic Tool
Cincinnati Rubber Mfg. Co., Cincinnati, O.
N. Y. Belting & Packing Co., New York City.

HYDRATING MACHINERY
Atlas Car & Mfg. Co., Cleveland, Ohio.
Kritzer Co., The, Chicago, Ill.
Miscampbell, H., Duluth, Minn.
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HYDRAULIC DREDGES
Morris Machine Works, Baldwinsville, N. Y.

INDUSTRIAL CARS
Atlas Car & Mfg. Co., Cleveland, Ohio.
Easton Car & Constr. Co., Easton, Pa.
International Clay Machine Co., Dayton, Ohio.
Koppel Indust. Car & Equip. Co., Koppel, Pa.
Watt Mining Car Wheel Co., Barnesville, Ohio.

LIME KILNS
Arnold & Weigel, Woodville, Ohio.
Steacy-Schmidt Mfg. Co., York, Pa.
Vulcan Iron Works, Wilkes-Barre, Pa.

LOADERS AND UNLOADERS
Ball Engine Co., Erie, Pa.
Gifford-Wood Co., Hudson, N. Y.
Good Roads Mach. Co., Philadelphia, Pa.
Green, L. P., Chicago, Ill.
International Clay Mach. Co., Dayton, O.
Jeffrey Mfg. Co., The, Columbus, Ohio.
Portable Mach. Co., Passaic, N. J.
Stephens-Adamson Mfg. Co., Aurora, Ill.

LOCOMOTIVES
Baldwin Locomotive Works, The, Philadelphia, Pa.
Fate-Root-Heath Co., Plymouth, Ohio.
Jeffrey Mfg. Co., The, Columbus, Ohio.
Lima Locomotive Works, New York City.
Porter Co., H. K., Pittsburgh, Pa.
Vulcan Iron Works, Wilkes-Barre, Pa.
Whitcomb Co., Geo. D., Rochelle, Ill.

MOTORS, ELECTRIC
Gifford-Wood Co., Hudson, N. Y.

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Duplex Truck Co., Lansing, Mich.
Packard Motor Car Co., Detroit, Mich.
Pierce-Arrow Motor Car Co., Buffalo, N. Y.

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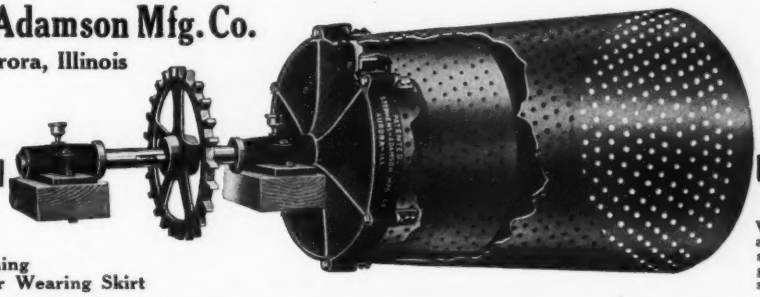

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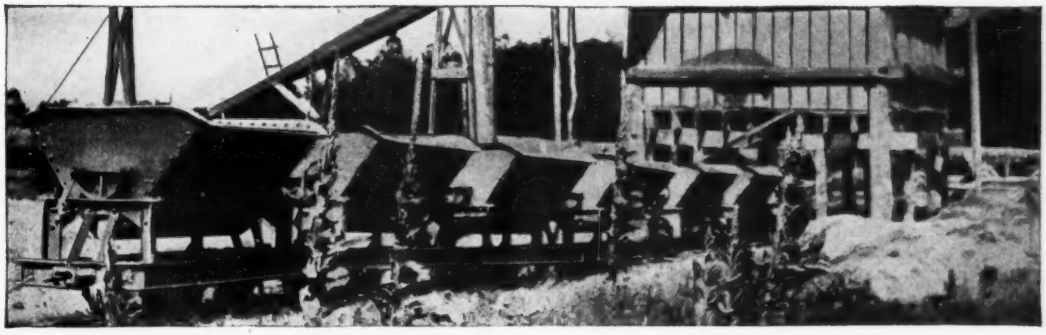

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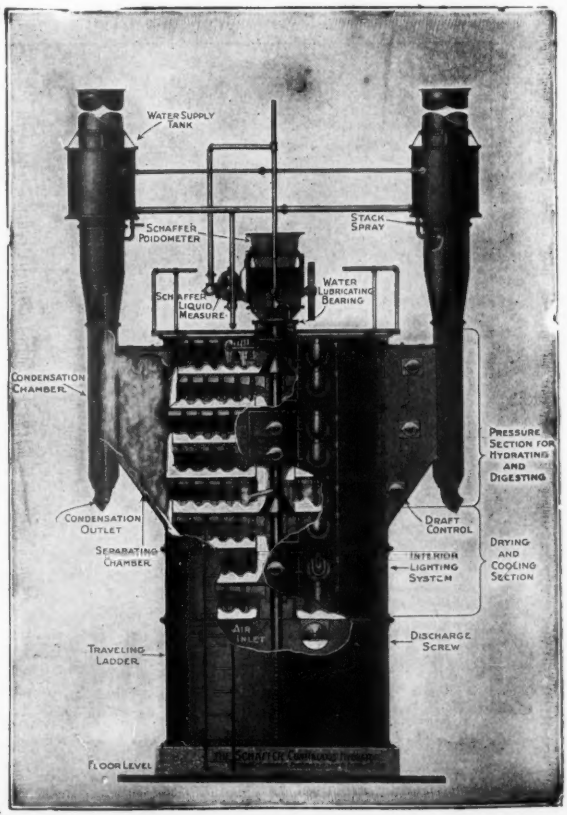

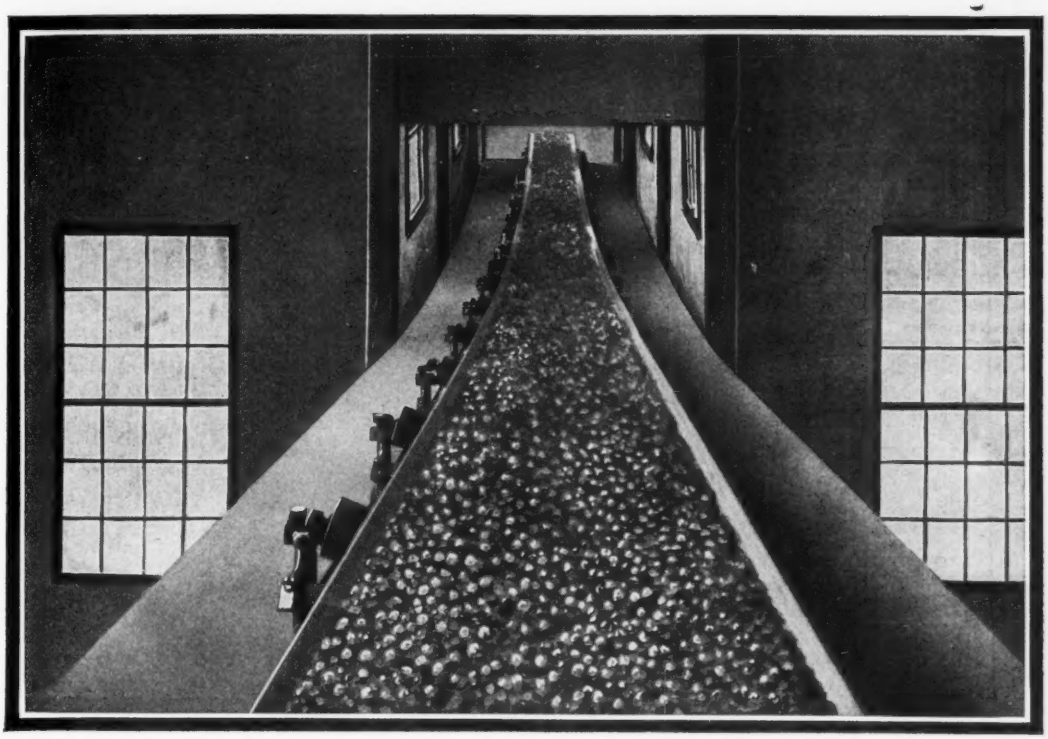

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